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The Usefulness of Segment Information in Predicting Divestitures

and

The Effects of CEO Turnover and Management Incentives Divestitures

by

Peter Chen

A thesis submitted to the Faculty of Graduate Studies and Research

in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

ACCOUNTING

Faculty of Business

Edmonton, Alberta

Spring 1999

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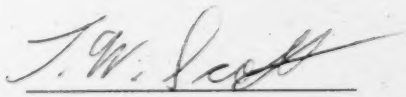
The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Usefulness of Segment Information in Predicting Divestitures and The Effects of CEO Turnover and Management Incentives on Divestitures submitted by Peter Chen in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Accounting.



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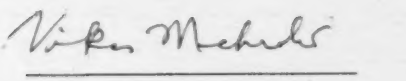

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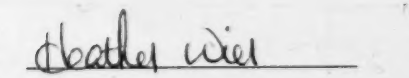

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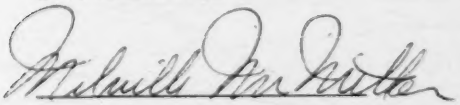

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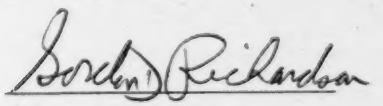

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Date: August 6, 1998

However, we find no support for the hypothesis that managers time divestitures to take an earnings bath. In addition, we find no evidence to support that the existence of long-term incentive plan increases the timeliness of divestitures. Finally, we find that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus, whereas higher equity ownership either by the CEO or by insiders as a group has no significant effect on the likelihood of divestitures that increase corporate focus.

Taken together, our results suggest that divestitures are not driven by poor segment performance *per se* rather are driven by new CEOs disposing of segments for which the exit value exceeds the going concern value and the existence of these disposal opportunities follows from prior CEOs falling to divest in a timely manner. These findings are in favor of the management entrenchment hypothesis rather than other competing rationales for asset disposals. In addition, the finding that new CEOs divest segments more regardless of segment performance is consistent with new CEOs bringing in different skills and strategies in managing assets. Assuming that an increase in focus is value increasing, our finding that higher equity ownership by outside directors increases the likelihood of focus-increasing divestitures is consistent with board effectiveness increasing in the equity stake by outside directors. The poor performance of divested segments that were associated with CEO turnover also suggests a stewardship role for segment information in managerial contracts.

ABSTRACT

I. The Usefulness of Segment Information in Predicting Divestitures

This paper reports results from an empirical study on the usefulness of segment information in predicting divestitures controlling for the use of aggregate information. Based on a large sample of segment divestitures by US multi-segment firms for the period from 1990 to 1995, the results indicate that divestitures are driven by forces originating at the industry, firm and segment levels. Our findings suggest that industry, firm and segment information complement each other in predicting divestitures. The empirical tests uniformly reject the null hypothesis that segment information is not incrementally useful in predicting subsequent divestitures.

II. The Effects of CEO Turnover and Management Incentives on Divestitures

In this paper, we investigate the effects of CEO turnover and management incentives on divestitures. Using a sample of 100 firm-year or 117 segment-year divestitures during the period from 1990 to 1995 and a control sample of industry- and size-matched nondivesting observations, we find that divesting firms are more diversified and have poorer performance than their control counterparts in the year preceding divestitures. The difference in the number of business segments between the two groups disappears in the year of divestiture.

Our results from logistic regressions indicate that divested segments that were associated with CEO turnover had poorer performance than those that were not associated with CEO turnover. Controlling for the past performance of divested segments associated with CEO turnover, we find CEO turnover increases the likelihood of divestitures.

DEDICATION

To the memory of Lane Daley

ACKNOWLEDGEMENT

I am most indebted to Lane Daley and Tom Scott, my supervisors, for their guidance, encouragement, and assistance during various stages of my doctoral program. I would also like to extend my thanks to Gary Biddle, Peter Clarkson, Mel McMillan, Vikas Mehrotra, Gordon Richardson, Ranjini Sivakumar, Jim Xie and Heather Wier for useful comments. Financial support from the PhD program of the Faculty of Business is gratefully acknowledged. I owe a special thank to my wife, Qian Li, and my children, Leslie, Stephanie and Daniel, for their patience and understanding.

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CHAPTER 1

INTRODUCTION

This thesis consists of two empirical studies on firms' divestitures of segments of businesses. Chapter 3 contains a study that examines the usefulness of segment information in predicting divestitures controlling for the use of aggregate information. Chapter 4 contains an empirical study that investigates the effects of CEO turnover and management incentives on divestiture decisions. The purpose of the first study is to provide insights into the role of segment information in financial statement analysis in general and in predicting divestitures in particular. The purpose of the second study is to assess the role of top management and their incentives in divestiture decisions, and to insure that the results from Chapter 3 are not attributable to omitting factors pertaining to CEO incentives. In the next two sections of this chapter, we introduce the motivation, research design, and major findings of these two empirical studies.

1. The Motivation, Research Design and Major Findings of Studying the Usefulness of Segment Information in Predicting Divestitures

Our motivation for studying the usefulness of segment information comes from three areas of interests. First, divestitures are important events to divesting corporations and thus predicting divestitures is relevant to various stakeholders of the firm. Second, predicting divestitures is an interesting setting that broadens the scope of existing studies on the usefulness of segment information. Finally, empirical evidence on the usefulness of segment information in predicting divestitures can provide useful input in accounting standard-setting on the financial reporting of segment information.

Numerous studies in the financial economics literature have reported evidence that divestitures generate, on average, positive stock price reactions to the divesting firms upon announcements (e.g. Schipper and Smith 1983; Jain 1985; Lang et al. 1995)[1]. Recent papers also document that divestitures are associated with long-term financial effects such as improved stock return and cash flows on the continuing operations (Comment and Jarrell 1995; Daley et al. 1997). Besides stockholders' interest in divestitures, debtholders' interest in divestitures stems from the fact that divestitures can potentially change the collateral underlying their claim. As a result, wealth may be transferred from debtholders to shareholders through divestitures (Galai and Masulis 1976; Smith and Warner 1979; Schipper and Smith 1983; Parrino 1997). Therefore, assessing the likelihood of divestitures is relevant to various stakeholders of the firm[2].

Investigating the usefulness of segment information in predicting divestitures also broadens the scope of existing research on the usefulness of segment information. The accounting literature contains several strands of empirical studies on the usefulness of segment information after the adoption of Statement of Financial Accounting Standards (SFAS) No. 14. Kinney (1971) and Collins (1976) examined whether the use of segment data improves the forecast of future earnings and reported evidence that earnings forecasts using both segment and aggregate data are closer to realized future earnings than those using aggregate data alone. Foster (1975) and Tse (1989) assess the incremental usefulness

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[1] It is important to understand that findings on the usefulness of segment information in predicting divestitures do not contradict the fact that stock prices still react to announcement of divestitures. As long as the information including segment information is not fully revealing, stock prices still react to announcements of divestitures.

[2] These interests are also reflected in the financial press that frequently contains analysts' assessments or speculations of firms' divestiture activity.

of segment earnings in explaining firms' stock returns. They documented evidence that a finer breakdown of aggregate earnings is incrementally useful in explaining firms' stock returns (see Chapter 2 for a review of prior empirical studies on the usefulness of segment information).

This study extends the scope of inquiry to examining the usefulness of segment information in predicting divestitures at the segment level. By choosing a decision context in which differential economic behaviors of segments are important, we increase the power of the tests for the usefulness of segment information. Also in contrast to prior studies on the usefulness of segment information that focused mainly on the usefulness of segment earnings, our decision context allows us to investigate the usefulness of a broad set of segment information.

Investigating the usefulness of segment information in predicting divestitures is also consistent with financial analysts' view on the usefulness of segment information. For example, a position paper on corporate financial reporting with respect to segment information by the Association for Investment Management and Research states:

> "It [segment information] is vital, essential, fundamental, indispensable and integral to the investment analysis process. Analysts need to know and understand how the various components of a multifaceted enterprise behave economically. One weak member of the group is analogous to a section of blight on a piece of fruit; it has the potential to spread rot over the entirety. Even in the absence of weakness, different segments will generate dissimilar streams of cash flows to which are attached disparate risks and which bring about unique value. Thus, without disaggregation,

there is no sensible way to predict the overall amounts, timing or risks of a complete enterprise's future cash flows." (emphasis added)

By documenting systematic evidence on the usefulness of segment information in predicting divestiture, this study enhances our understanding the usefulness of segment information in financial statement analysis in general.

Finally, empirical evidence on the usefulness of segment information in predicting divestitures can be a useful input in standard-setting on reporting segment information. In recent years, financial analysts and accounting practitioners have expressed their dissatisfaction with SFAS No 14 and have requested major changes from standard-setters. In particular, they charge that the use of industry as the basis for disaggregation reduces the relevance of segment information because segment information does not correspond to the information that managers use internally in decision-making. Against this backdrop, Financial Accounting Standards Board (FASB) in the US, jointly with Canadian Accounting Standard Boards, issued an Exposure Draft on Financial Reporting for Disaggregated Information about a Business Enterprise in 1996 and now a new standard in 1997[3]. This standard changes the basis of disaggregation from industry segment to one that is consistent with the organization units for which management collects information internally in evaluating performance and allocating resources. In addition, the new standard requires disclosures of segment information in interim reports, which will increase the timeliness of segment information to users of financial statements.

[3] See SFAS No.131 Disclosures about Segments of an Enterprise and Related Information.

Divestitures are management's major decisions on resource allocation. Understanding how useful segment information is in predicting divestitures can provide useful input to standard-setters. The empirical evidence can be used to assist standard-setters in trading-off the benefits and costs of alternative basis for segment reporting in their current attempt to improve disclosures of segment information.

We develop a probabilistic model of divestitures based on theories in the economics and finance literature. Using this model, we assess the usefulness of segment information in predicting divestitures controlling for the use of aggregate information. Using a large sample of segment divestitures by multi-segment US firms on COMPUSTAT Industry Segment File for the period from 1990 to 1995, the empirical results suggest that divestitures are driven by forces originating from industry, firm and segment levels. Therefore, industry, firm and segment information complement each other in predicting divestitures. Our empirical tests uniformly reject the null hypothesis that segment information is not useful in assessing the probability of segment divestitures controlling for the use of aggregate information one year prior as well as two years prior to the announcements of divestitures.

2. The Motivation, Research Design and Major Findings of Investigating the Effects of CEO Turnover and Management Incentives on Divestitures

There is considerable controversy on the role of top management and their incentives on divestiture decisions. Part of the controversy stems from the observation that divestitures often cluster at the time of CEO turnover (Ravenscraft and Scherer 1987; Weisbach 1988). This clustering of divestitures surrounding CEO turnover may occur

because incoming CEOs use their discretion to manipulate earnings, because incoming CEOs correct their predecessors' failure to divest or because new CEOs have different skills and strategies in managing assets from their predecessors'. A proper interpretation of the causality requires a simultaneous examination of investment decisions in prior years and management incentives in the year of divestitures.

In Chapter 4, we undertake an empirical investigation on the effects of CEO turnover and management incentives on divestiture decisions. Specifically, we examine whether divested segments that were associated with CEO turnovers had poorer performance than divested segments that were not associated with CEO turnovers. We also examine whether CEO turnover increases the likelihood of divestitures controlling for the past performance of assets divested. In this way, positive evidence would suggest that replacement CEOs undertake divestitures because of different viewpoints on investment decisions or because of their incentives for earnings management. With respect to the former, management entrenchment hypothesis suggests that the prior CEO might choose to continue operating a segment because it benefits the CEO personally even though the segment can be sold for more than its going concern value. CEO turnover corrects this problem in that a new CEO, with no vested interest in keeping the segment, is more likely to dispose of the segment if the proceeds are in excess of the net present value of keeping the segment. We further examine whether the timing of divestitures is consistent with a management incentive to take an earnings bath and whether the existence of accounting-based long-term incentive plan increases the timeliness of divestitures. Finally, we examine whether larger equity ownership by the

CEO, insiders (directors and executives as a group) and outside directors influences the likelihood of divestitures that increase corporate focus.

We investigate the effects of CEO turnover and incentives on divestitures using a sample of 100 firm-year observations that involve 117 sell-offs of segments for the period from 1990 and 1995 and a control sample of industry- and size-matched non-divesting observations. The empirical evidence indicates that divesting firms are more diversified and have poorer earnings performance relative to their control firms in the year preceding divestiture. Also divesting firms have significantly poorer stock performance in the year of divestitures. The results from logistic regressions that assess the effects of CEO turnover and management incentives on divestitures indicate that divested segments that were associated with CEO turnover had significantly poorer performance than divested segments that were not associated with CEO turnover. This suggests that poor performance of divested assets was one reason for the CEO's departure and divestitures by replacement CEO serve the function of correcting departing CEO's unwillingness to dispose of poorly performing segments.

Furthermore, controlling for the past performance of divested segments that were associated with CEO turnover, we find that CEO turnover increases the likelihood of divestitures. This suggests that some divestitures associated with CEO turnover take place because of different abilities and strategies between replacement CEOs and their predecessors or because of their incentives for earnings manipulation. However, we find no evidence to support the hypothesis that managers time divestitures in the year when they finish in the low bound of their annual bonus plans. We interpret this as inconsistent with the 'big bath' hypothesis. Also we find no support for the hypothesis that the

existence of earnings based long-term incentive plan increases the timeliness of divestiture decisions. Finally, we find that high equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus. In contrast, we find that higher equity ownership either by the CEO or by insiders (directors and executives as a group) has no significant effect on the likelihood of divestitures that increase corporate focus.

Overall, our results suggest that divestitures are not driven by poor segment performance *per se* rather are driven by new CEOs disposing of segments for which the exit value exceeds the going concern value and the existence of these disposal opportunities follows from the prior CEOs falling to divest in a timely manner. These findings are more consistent with the management entrenchment hypothesis rather than the earnings management hypothesis for asset disposals. In addition, the finding that new CEOs divest segments more regardless of segment performance is consistent with new CEOs bringing in different skills and strategies in managing assets. Assuming that an increase in focus is value increasing, our finding that higher equity ownership by outside directors increases the likelihood of focus-increasing divestitures is consistent with board effectiveness increasing in the equity stake by outside directors.

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CHAPTER 2

REVIEW OF PRIOR EMPIRICAL STUDIES ON THE USEFULNESS OF SEGMENT INFORMATION

Previous empirical studies have employed two types of research designs in investigating the usefulness of segment information. The first type of research design explores the effect of differential economic behaviors of segments of businesses and examines how segment data improve users' decision-making beyond aggregate accounting data. Users' decisions examined in existing literature include predicting firm's future earnings (Kinney 1971; Collins 1976) and assessing firm's stock prices (Foster 1975; Tse 1989).

The second type of research design examines the effects of differential information environments before and after the adoption of SFAS No.14. This research design usually employs an experiment group and a control group. Since some firms already voluntarily disclosed segment data (sales or earnings) prior to the 1970 adoption date, those firms become the control group in the experiment design. Researchers examined the effects of segment disclosures on the accuracy of analysts' forecast (Baldwin 1984), change of firm's systematic risk measured by the market beta (Collins and Simonds 1979; Horwitz and Kolodny 1977), price variability (Swaminathan 1991) and bid-ask spread (Greenstein and Sami 1994). Results from these studies are largely consistent with the hypothesis that SFAS No. 14 on segment reporting created a difference in the information provided to users of financial statements. In the following, we use these two types of research designs to guide our review of prior studies on the usefulness of segment information.

Two early studies examine whether the use of segmental data such as sales and earnings improves the forecast of consolidated income (Kinney 1971; Collins 1976). Segment data can potentially improve the accuracy of forecasting future earnings because segments differ in their expected growth rates of earnings. One source of this difference comes from different expected growth rates of earnings in segments' industries. Assuming that a segment's rate of growth in earnings (sales) is the same as the expected rate of growth for its industry, Kinney (1971) and Collins (1976) derive a set of earnings forecasts using segment earnings (sales) multiplied by the expected rate of growth for the segment's industry and then multiplied by either consolidated profit margin or segment's profit margin. Alternatively, without using segment information, these researchers use time-series models of past consolidated earnings to obtain another set of earnings forecasts. By comparing the two sets of earnings forecasts with the actual realized future earnings, Kinney (1971) reports evidence that the earnings forecasts using segment data were more accurate than models based on consolidated earnings alone using 24 companies that voluntarily disclosed segment data in 1967 and 1968. Collins (1976) reports similar evidence using segment data disclosed under SFAS No.14 for a sample of 96 firms. These researchers interpret their results as supportive to the disclosures of segment information.

Foster (1975) studies the security price reaction to the disclosure of segment earnings in the insurance industry. In the insurance industry, there was separate disclosure of earnings from underwriting, investment and capital gains and losses on marketable securities. His previous research shows that abnormal stock return (CARs) around earnings announcement for earnings from underwriting is twice that for earnings from

investment and that CAR for earnings from investment is approximately twice that of capital gains and losses. This resembles the notion of different earnings response coefficients for earnings out of different sources. Earnings from underwriting are more permanent than earnings from investment, which, in turn, is more permanent than earnings from gains and losses from security trading. Foster uses the sign of the earnings change for each segment to partition the aggregate earnings into eight states. Given the differential CARs for earnings from different sources, he predicts the magnitude of CARs at the earnings announcement to be different depending on the changes of segment earnings. His sample includes 58 insurance companies for the period from 1965 to 1972. The result indicates that a finer level of disclosure allows the market to distinguish between the occurrence of states that have different revaluation implications for firms' securities.

Tse (1989) examines the incremental information provided by disclosing segment sales and earnings in a model of common stock value that includes measures of earnings, risk and growth. His purpose was to determine how the model would be affected by including (1) a measure of growth prospects based on firm's primary industry SIC code reported by COMPUSTAT and (2) a measure of the actual proportion of the firm's involvement in high versus low growth industries based on reported segment sales and earnings. His sample includes 188 to 367 firms annually for the period from 1975 to 1979. His evidence indicates that the measure of growth based on the firm' primary SIC code was statistically significant in explaining market value of common stock in three out of five years; (2) the measure of growth based on segment sales (earnings) was statistically significant in five (four) out of five years; and (3) when both measures of

growth are included in the model, only segment-based measures of growth is consistently significant in the valuation model. Based on this result, he concludes that "segment data possess incremental information over primary industry data for security price but the converse is not true" (Tse 1989; p606).

The studies reviewed above have explored differential economic behaviors among segments of businesses that are caused by industry-wide differences in growth or permanence of earnings. The evidence is consistent with the notion that segment information is useful to users in assessing the industry effect on segment's future earnings or firm's stock prices. However, these studies assume that there are no other causes of differences among segments of businesses. Our study in Chapter 3 extends the scope of these studies to investigate the usefulness of segment information in predicting divestitures. This decision context allows us to examine multiple sources of differences among segments of businesses and also to examine the usefulness of a broad set of segment information rather than segment earnings alone.

Baldwin (1984) employs the second type of research design to examine whether the disclosure of segment information under SFAS No.14 improved the accuracy of analysts' earnings forecasts. He draws analyst's earnings forecasts from Value Line for three groups of firms that totals 188. The three groups were (1) diversified companies that first reported segment earnings in 1971; (2) diversified companies that voluntarily reported segment earnings prior to 1971 and (3) single-segment firms that reported only consolidated earnings both before and after 1971. He found that the mean and variance of the forecast errors for both groups of diversified firms decreased after 1971 but the largest reduction in forecast error was for the group of firms that disclosed segment earnings data

for the first time in 1971. Also he found that single-segment firms experienced relatively constant forecast accuracy both before and after the adoption of Statement No.14. He interpreted the result as supportive to the assertion that disclosures of segment information and segment earnings in particular increase the accuracy of analysts' earnings forecasts.

Several studies examine whether disclosure of segment information resulted in the shift of firm's systematic risk after the adoption of Statement No. 14. Researchers measure the systematic risk by estimating the market model's beta. Both Simons and Collins (1978) and Collins and Simons (1979) find a downward shift in estimated beta for firms that began reporting segment information when SFAS 14 was implemented. However, Horwitz and Kolodny (1977) find little evidence of downward shift in beta. Theoretically, the disclosure of segment data may be useful to investors in discerning the allocation of assets, sales and earnings in different segments and results in a better assessment of firm's systematic risk. However, a more accurate assessment does not by itself imply a directional prediction for the change of systematic risk. The explanation used by Collins and Simons (1979) to justify the reduction of systematic risk is that SFAS 14 reduces investors' uncertainty about companies' future cash flow since some empirical evidence indicates that future earnings can be more accurately predicted by using segmental data. Therefore, the conclusion out of these studies is that there is mixed evidence on the effect of disclosure of segment information on the change of firm's systematic risk.

Swaminathan (1991) employs the second type of research design to study the effect of segment disclosure regulation on stock price variability and divergence of

analysts' forecasts. The paper relies on analytical results from information economics to argue that more precise information about a firm's value should increase price variability of stock prices on the information release date and decrease divergence of beliefs in analysts' earnings forecast. To test these hypotheses, the author defines 160 firms that have no segment disclosures prior to 1970 or disclosed only segment revenue in 1969 10-K reports as the experiment group. The control group includes 101 firms that had disclosed both segment revenue and earnings before and after 1970. The author's result shows that price variability associated with the release of 1970 10-K reports was significant greater than that associated with 1969 10-K reports for the experiment group but not for control group. Similarly, the coefficient of variation of earnings forecasts for the experiment group shows significant reduction but not for the control group.

Using a research design similar to Swaminathan (1991), Greenstein and Sami (1994) examine whether the segment disclosure regulation impacts the bid-ask spread of firms that disclose segment information for the first time. Their argument for the change in bid-ask spread is that segment information provides more and finer information and therefore reduces the information asymmetry among equity traders. The paper finds that those firms reporting segment data for the first time in their 1970 10-K reports have a significantly greater shift in their relative bid-ask spread than do either firms in the control group that previously reported segment revenue and earnings or single-segment firms.

Even though researchers using the second type of research design have reported evidence that SFAS No.14 caused a difference in the overall information provided to users of financial statements, they have not explored the effects of individual segment

data. Thus they have offered few insights into the use of segment information in financial statement analysis.

In summary, our review of the prior empirical studies on the usefulness of segment information under SFAS No. 14 indicates that there is little research on the usefulness of segment information in predicting corporate changes that involve economic units within organizations. Thus an empirical investigation of the usefulness of segment information in predicting divestitures broadens the scope of existing studies on the usefulness of segment information. Given the popularity of divestitures in the corporate restructuring of the 1980s and 1990s, such a study can potentially provide rich insights into the usefulness of segment information in financial statement analysis in general and in predicting divestitures in particular.

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CHAPTER 3

THE USEFULNESS OF SEGMENT INFORMATION IN PREDICTING DIVESTITURES

1. INTRODUCTION

Divestitures of segments of businesses are important events to the divesting corporations. Numerous studies show that divestitures are associated with on average positive abnormal stock returns to divesting firms upon announcements (e.g., Schipper and Smith 1983; Jain 1985; Hite et al. 1987; Lang et al. 1995). Recent studies also report evidence that divestitures are associated with significant improvement in operating performance in post-divestiture years (John and Ofek 1995; Daley et al. 1997). In addition, several papers suggest that divestitures may cause wealth transfer from debtholders to shareholders (Galai and Masulis 1976; Smith and Warner 1979; Parrino 1997). Therefore, not surprisingly, divestiture decisions draw attention from shareholders, creditors and financial analysts. However, little research has been devoted to studying whether accounting information and disclosures on segment information in particular are useful in predicting this important event. The purpose of this study is to empirically investigate the usefulness of segment information disclosed under SFAS No.14 in predicting segment divestitures controlling for the use of aggregate information[1].

The primary objective of reporting segment information as stated in SFAS No.14 is to assist users in assessing the differences in profitability, growth opportunities and

[1] Similar research includes studies on the use of accounting information in predicting corporate bankruptcies (see, Ohlson 1980) and in predicting takeover targets (see, Palepu 1986). However, our focus differs somewhat from these studies by emphasizing hypothesis testing rather than the forecasting ability of a predictive model.

risks among segments of businesses and their impact on the future prospects of the firm. SFAS No.14 requires firms to disclose assets, sales, operating earnings, depreciation expense, capital expenditure and several other items for each segment of business in their annual reports. Given that segment divestitures involve the separation of a segment from continuing operations, we undertake an empirical analysis on the usefulness of segment information in predicting subsequent divestitures.

A number of observers and studies suggest that divestitures are not random events but are driven by forces originating at industry, firm and sub-entity levels (Schipper and Smith 1983; Ravenscraft and Scherer 1987; Jensen 1993). In this study, we draw on existing theories in economics and finance literature to develop a logistic model of divestiture decision. We then use this model to empirically assess the incremental usefulness of segment information in predicting segment divestitures one year as well as two years prior to management decisions.

Based on a large sample of segment divestitures made by US multi-segment firms for the period from 1990 to 1995, the major findings of this study are summarized as follows:

(1) Using industry operating performance and excess capacity as proxies for industry shock, we find that the probability of divestiture in subsequent years is positively related to the existence of industry shock in the segment's line of business, but not in the firm's primary line of business. This finding is consistent with prior evidence on the industry effects on mergers and takeovers (Mitchell and Mulherin 1996) and Jensen (1993)'s observation that divestitures are influenced by the need to reduce industry excess

capacity. It also indicates that the industry effect on divestitures is more directly captured by the segment's line of business than by the firm's primary line of business.

(2) Consistent with the corporate focus hypothesis, the probability of segment divestiture is positively related to the un-relatedness of the segment's line of business to the firm's primary line of business. This finding, together with (1), suggests that disclosures on the industry attribute of a business segment are incrementally useful in predicting divestitures beyond the industry attribute of the firm's primary line of business.

(3) Controlling for other variables in the logistic model, we find that the likelihood of divestiture is negatively related to the segment's performance, growth opportunity and segment size as well as market share. The empirical evidence, therefore, suggests that segment's accounting data are also useful in predicting divestiture decisions.

(4) Our empirical results also indicate that the likelihood of divestiture is negatively related to the firm performance (operating return) and positively related to firm's leverage ratio (total liability divided by total assets). In contrast, we find no evidence that divestitures are related to the firms' demand for external financing.

(5) Besides testing for the usefulness of individual disclosures, we also test for the incremental usefulness of segment information as a group. Our tests uniformly reject the null hypothesis that segment disclosures are not useful in predicting divestitures.

This study extends previous studies on the usefulness of segment information in two ways. Prior studies have examined the usefulness of segment information in predicting firms' future earnings (Kinney 1971; Collins 1976), assessing firms' stock returns (Foster 1975; Tse 1989) and systematic risks (Horwitz and Kolodny 1977; Collins and Simonds 1979). This study extends the scope of inquiry to examining the usefulness

of segment information in predicting firms' divestiture decisions directly at the segment level. Secondly, prior studies have limited their investigation to the usefulness of segment earnings; this study examines the usefulness of a broad set of segment information.

Our findings are relevant to the US and Canadian standard-setters' project on *Reporting Disaggregated Information about a Business Enterprise*. This project proposes to address two major criticisms on SFAS No.14 from financial analysts and accounting practitioners: First, both analysts and practitioners charge that the use of industry segment as the basis for disaggregation has resulted in industry segments being defined too broadly by management. In addition, analysts believe that the use of industry segment as the basis for disaggregation lessens the relevance of segment information since industry segments do not necessarily align with organization units on which managers make decisions. Second, they criticize SFAS No.14 for not making disclosures of segment information mandatory in interim reports (see, Pactor 1993). In responding to the demand for changes, FASB and Accounting Standards Board of CICA issued the Exposure Draft on *Reporting Disaggregated Information about a Business Enterprise* in 1996 and now a new standard in 1997. This new standard on segment reporting changes the industry segment approach under SFAS No.14 to a management approach. This management approach requires management to define segments as the organizational units that management collects information internally in evaluating performance and allocating resources.

Divestitures are obviously major management decisions on resource allocation. Our findings on the usefulness of segment information in predicting divestitures provide useful information to standard setters. Our finding that the industry attributes of a

segment provide incremental information in predicting divestitures suggests that there are potential costs associated with changing segment reporting from industry approach to a management approach. Under the management approach, it may become more difficult for users to compare segment information between firms and to analyze the impact of industry forces on a firm's earnings prospects. On the other hand, consistent with the charge by financial analysts, a large number of divestitures had no prior disclosures on the sub-entities divested. The use of industry segment as the basis for disaggregation may be one of the causes of non-disclosure. By incorporating organizational structure and management intention in reporting segment information, the new approach may improve disclosures on organization units that subsequently become divestiture candidates. Thus the results of this paper provide standard-setters with insights into the potential benefits and costs of alternative bases of segment reporting.

This study also enhances our understanding of the divestiture phenomenon. First, we document systematic evidence on major factors that influence divestiture decisions. In particular, our empirical analysis on the effects of industry performance and excess capacity on segment divestitures extends prior study of industry effect on restructuring activity at the industry level (Mitchell and Mulherin 1996). Second, our results show that industry, firm-specific and segment information complement each other in predicting divestitures. These results suggest that research focusing solely on the value-relevance of accounting earnings is too restrictive and may lead to unwarranted conclusions for firms undertaking frequent corporate changes such as divestitures.

The reminder of this chapter is organized as follows. In section 2, we develop a probabilistic model of divestiture decision, variables and measurements for empirical

analysis. Section 3 discusses sample selection procedure and the identification of segment divestitures. Section 4 reports the empirical results of various tests for the usefulness of segment information in predicting divestitures. Section 5 summarizes and concludes this chapter.

2. HYPOTHESIS DEVELOPMENT AND A PROBABILISTIC MODEL OF DIVESTITURE, VARIABLES AND MEASUREMENTS

2.1 Information Garbling and the Usefulness of Segment Information in Predicting Divestitures

Although segment reporting is mandatory under SFAS No. 14, the standard provides considerable latitude in the definition of a reportable segment and in the allocation of common costs in reporting segment performance. Therefore, segment disclosures depend to a considerable degree on the judgment of corporate management. Analysts state that great discretion in Statement No. 14 has been exploited by many corporations to suit their own financial reporting purposes (AIMR, p.40). If managers use their discretion to define segments too broadly and to allocate common costs in such a way that conceals segment performance as charged by analysts, segment information ought to have no incremental usefulness in predicting divestitures. Our empirical tests will provide evidence on whether this null hypothesis of no information content for segment disclosures will be rejected.

In addition to analysts' concern on the quality of segment information in Statement No. 14, academic accountants also begin to examine the effects of management discretion on segment disclosures (Pactor 1993; Hayes and Lundholm 1996). Hayes and Lundholm (1996) analyze how firms choose the appropriate level of aggregation in

segment disclosures given that such disclosures are observed by both competitors and the capital market. In their model, management's decision on the level of segment disclosures trade off the benefits of informing the investors about firm value against the proprietary cost of segment disclosures in aiding the competitors. They show that firms with similar results from different operations will report as separate segments, but firms with disparate results from different product lines are more likely to report a single segment. Also they show that a firm is more willing to disclose its segments separately when the segment with the most permanent earnings series also has the better performance signal in order to distinguish itself from a firm whose relatively good signal is from more transient earnings.

The implication of their model for empirical analysis is as follows: high proprietary costs of segment disclosures should lead management to conceal the differences among segments of businesses. As a result, segment disclosures should not provide useful information in predicting divestitures beyond aggregate information because of management incentive to garble. On the other hand, if the benefit of informing the capital market overrides the proprietary costs of informing the competitors, segment information should still be incrementally useful in predicting divestitures. The empirical finding of no information content of segment disclosures (the null hypothesis) would be consistent with management discretion in reporting segment information due to high proprietary cost of segment disclosures.

2.2 A Probabilistic Model of Segment Divestiture

We define segment divestiture as the separation of a segment of business from the

continuing operations of the parent firm. Divestitures can take various forms. The vast majority of divestitures are sell-offs when segments of businesses are sold to other corporations in exchange for the proceeds on the market value of the assets. Some divestitures involve spin-offs of segments of businesses to become separately traded corporations by distributing shares to existing shareholders or outside investors[2]. It is also possible that some divestitures involve partial sell-offs and partial close-downs of segments of businesses. Despite the different forms that divestitures may take, they share a common feature in that previously-owned segments of businesses are separated from the continuing operations of the firm. Therefore, we take this common ground as our definition of divestiture.

The objective of our empirical analysis is to assess the usefulness of segment information in predicting divestitures controlling for aggregate information. For our empirical purpose, we posit that the likelihood of segment divestiture can be viewed as being jointly determined by the attributes of the segment and the attributes of the firm in which the segment is located. To put this into a probabilistic model of segment divestiture, let $P(i,t+1)$ be the probability that a segment of business i will be divested in period $t+1$, X^F_{it} be a vector of measured firm attributes for segment i, and X^S_{it} be a set of segment attributes for segment i, a functional relationship between the probability of a segment's divestiture and the sets of attributes can be written as the following:

$$P(i,t+1) = f(X^F_{it}, X^S_{it}) \qquad (1)$$

[2] We also undertake separate analyses of sell-offs and spin-offs later in section 4.4.

A usually employed functional form is the logit function;

$$P(i,t+1)=\frac{(1-e^{-\beta^F X_{it}^F-\beta^S X_{it}^S})}{e^{-\beta^F X_{it}^F-\beta^S X_{it}^S}} \qquad (2)$$

where β^F, β^S are the corresponding vectors of coefficients for the vectors of firm attributes and segment attributes respectively. Our research focus is on whether segment attributes based on disclosed segment information are useful in predicting divestitures. We regard segment information as useful if its use leads to significant revisions on the assessed likelihood of divestitures in the absence of segment information. In other words, the null hypothesis that segment information is not useful in predicting divestitures implies: β^S=0.

To select variables that represent the sets of firm and segment attributes, we survey existing theories in economics and finance literature on factors that are hypothesized to influence the probability of divestitures. We discuss six hypotheses suggested in the existing literature and their implied variables below.

2.3 Variables and Measurements

Two major theories in the economics and finance literature have been advanced to explain divestitures. The first one is investment theory that views divestiture as being no different from any other investment project that managers undertake to maximize the value of the firm. To make the divestiture of an existing segment a positive net present value project, the benefit of its divestiture should exceed that of its continuing operation within the firm. Empirical evidence of positive abnormal stock returns associated with divestitures is consistent with divestitures being positive net present value projects. The

existing literature has attributed several sources to the wealth effects of divestitures. These sources include resources being moved from a less valued use to a higher valued use, financing growth opportunities under constrained external financing and gain in management efficiency because of corporate focus and a less complex business structure (Weston et al. 1990, p.238).

In contrast to investment theory, agency-based theory views divestitures as arising out of the conflict of interest between management and shareholders. This theory predicts that divestiture decisions can be a consequence of poor current and future performance. For example, Mueller (1969) and Jensen (1986) hypothesize that managers seek to protect or build their empire to increase their perks and salaries. Managers may choose to invest in, or fail to divest of, projects for their own purpose even though these projects are not optimal for the firm. Amihud and Lev (1981) argue that managers may engage in risk-reduction activities to decrease their employment risk even though diversification does not serve shareholders' interests. As a result, divestitures can serve the function of correcting management decisions in prior periods.

Both investment theory and agency-based theory suggest that the likelihood of a segment's divestiture is assessable from the attributes of the segment and the attributes of the firm in which the segment is located. This is enough for our purpose in this paper that is to assess the usefulness of segment information in predicting divestitures controlling for aggregate information in the financial statement. We make no attempt to test whether one theory predicts divestitures better than the other because the underlying attribute may be consequences of both investment opportunity change and suboptimal investment decisions of prior periods. Also in the absence of a unique theory of divestitures, we build

our empirical model of divestitures based on major factors suggested in the existing literature that influence the likelihood of divestitures.

(1) Industry shock hypothesis

Economic theory that links firms' investment decisions and macroeconomic changes suggests that divestitures may be firms' responses to the changes of industry profitability and growth opportunity. This has been referred to as the industry shock hypothesis. Changes of industry profitability and growth opportunity may be triggered by changes in technology, industry structure and regulatory environment. This industry shock hypothesis has been used to explain the variation of merger rates cross industries in the 1950s by Gort (1969) and to explain the variation of takeover activity across industries in the 1980s by Mitchell and Mulherin (1996). The evidence reported by these studies is broadly consistent with an industry effect on the variation of mergers and takeover activities across industries. Empirical evidence of the clustering of divestiture rates across industries would be consistent with the industry shock hypothesis.

Jensen (1993) theorizes more specifically that divestitures and exit decisions in the 1980s and 1990s are fundamentally linked to excess capacity caused by industry-wide forces such as changes of technologies, energy prices and regulatory policies. He argues that divestitures, mergers and takeovers are necessary and perhaps the quickest ways to reduce excess capacity. Consistent with this excess capacity effect on divestitures, Lane (1993) reports case evidence that divestitures and takeovers in the Chemicals industry during the early 1980s were partly driven by the need to reduce excess capacity in that industry.

To empirically test the effect of industry shock (SHOCK) on the likelihood of divestitures, we first use an industry's operating performance relative to a broad spectrum of industries as a proxy for the existence of shock. Specifically, we define variable SHOCK to take the value of 1 if the industry's operating return falls into the lowest 25% in the distribution of operating returns for all 3-digit SIC industries and 0 otherwise. The operating return for each 3-digit SIC industry is computed as the aggregated operating income divided by the aggregate assets based on all US firm on COMPUSTAT. We choose this measure as our proxy for the degree of excess capacity for two reasons: first, industry operating return is intuitively appealing because, unlike the growth rate of sales used in prior research, it captures the change of sales as well as costs caused by industry-wide forces. Second, the use of a dummy variable rather than industry operating return directly is to mitigate possible influence of extreme values of industry operating return as well as to capture the notion of 'industry shock'.

Our alternative measure of industry shock (SHOCK) is the degree of industry excess capacity, which is the inverse of the Capacity Utilization Rate (1/CUR). CUR is defined as the production capacity utilized as a percentage of the total production capacity installed. This measure of industry shock is closely related to Jensen's notion of industry excess capacity. CUR is estimated monthly for industries in Manufacturing, Mining and Utilities and published by the US Federal Reserve. Therefore, we were able to use 1/CUR directly as our measure of SHOCK for only the portion of our sample of segments and firms located in Manufacturing, Mining and Utilities[3].

[3] Our annual CUR is the seasonally adjusted annual CUR published by the Federal Reserve. The CUR is available for 23 2-digit SIC and 19 3-digit SIC industries. The industry CUR for each firm (segment) is obtained from the firm's (segment's) closest SIC industry with CUR available.

There are reasons to believe that an industry that has considerable excess capacity should also be an industry with relative lower operating return. We further assess the correlation between the degree of industry excess capacity and industry operating return as well as several alternative industry financial measures suggested in the existing literature[4]. We find that the dummy variable based on industry operating return has the largest correlation coefficient with 1/CUR (Pearson correlation coefficient=0.26, p=0.005) out of several alternative industry financial measures for our sample period.

The industry effect hypothesis implies that the likelihood of segment divestiture is positively related to the existence of industry shock in the segment's line of business ($SHOCK^S$) and may also be positively related to the existence of industry shock in the firm's primary line of business ($SHOCK^F$)[5].

(2) Corporate focus hypothesis

Divestitures in the 1980s and 1990s have been characterized as the reversing of corporate diversification in both academic and business press. As pointed out by Bhide (1990), there are both advantages and disadvantages associated with diversified firms. Advantages of diversified firms include the substitute of an internal capital market for external financing, lower unsystematic risk as well as potential tax benefits. However, diversified firms are also associated with disadvantages such as slow reaction time, high

[4] We correlate 1/CUR with industry financial measures that include average growth rate of sales over the last five years (Ravenscraft and Scherer 1987; Mitchell and Mulherin 1996), asset turnover ratio, change of asset turnover ratio, operating return, return on assets for the period from 1989 to 1994. We find that only industry operating return is significant correlated with 1/CUR (Pearson correlation coefficient=0.22, p=0.03). Our results are qualitatively similar when the SHOCK takes value of 1 if the industry operating return falls below the median of operating return for all 3-digit industries and 0 otherwise.

[5] We suppress the subscript *it* on all independent variables for brevity.

overheads and perhaps misaligned incentives. Over time, the importance of the advantages and disadvantages may have been subject to change. For example, the importance of an internal capital market has been undermined by the development of mature and reliable external capital markets. Also investors have been given increased capability to monitor corporate managers because of the increased disclosure requirement. Furthermore, investors now have the ability to diversify their portfolio in capital markets at little cost; this further undermines the need for firms to diversify into different product lines for the same purpose. As a result, the excess benefits over costs of diversification in the 1950s and 1960s may well have been reversed in the 1980s and 1990s.

Empirical evidence reported in prior studies is also consistent with some divestitures being motivated to retain corporate focus. John and Ofek (1995) report that announcement stock returns are greater if divested assets were not in the primary line of business of the divesting companies. Comment and Jarrell (1995) report that annual stock returns in post-divestiture years are positively related to changes in levels of focus, where change of focus is measured either by the change of Herfindahl index or by the change of the number of segments being reported[6]. Daley et al. (1997) further find that market reactions to spin-offs of segments that were not in the same 2-digit SIC industry of the firm are significantly more positive than spin-offs of segments that were in the same 2-digit SIC industry of the firm.

Similar to those in prior literature, we measure the relatedness of divested assets

[6] Herfindahl index is the sum of the squares of each segment's sales as a proportion of firm's total sales. The closer the index value is to 1, the more concentrated are the firm's sales within a few of its segments, or the more focused its operations.

to the firm's primary line of business using three dummy variables that depend on whether the SIC code of the segment line of business and the SIC code of firm's primary line of business are equal at the 3-, 2- and 1-digit levels respectively ($FOCUS3^S$, $FOCUS2^S$, $FOCUS1^S$)[7]. $FOCUS3^S$ takes a value 1 if the segment's 3-digit SIC code is not equal to the 3-digit SIC code of the firm's primary line of business and 0 otherwise. Variables $FOCUS2^S$ and $FOCUS1^S$ are defined in a similar fashion. We include these three dummy variables to capture the possibility that the effect of focus motive on the likelihood of divestiture increases with the un-relatedness of the segment's line of business to the firm's primary line of business[8]. The corporate focus hypothesis predicts that the likelihood of a segment's divestiture is positively related to variables $FOCUS3^S$, $FOCUS2^S$ and $FOCUS1^S$. Positive coefficients for all three variables in predicting divestitures are then consistent with that the likelihood of divestiture increases in the un-relatedness of the segment's line of business to the firm's primary line of business.

(3) Segment's poor earnings prospects hypothesis

The reason often stated by management for divestitures is that divested units have poor earnings prospects relative to other operations. However, for divestitures to be positive net present value projects, the proceeds from sell-offs or cash flows from spun-off segments must be greater than the net present value of future cash flows from continuing operations within the firm. Existing literature contains at least three economic

[7] The first (or primary) SIC code for each segment retrieved from Industrial Segment file and the primary SIC code of the firm retrieved from COMPUSTAT are used throughout this paper.

[8] The use of 1-digit SIC is justified because "the structure of the classification makes it possible to tabulate, analyze, data on a one-digit, two-digit or three-digit industry groups according to the level of industry detail considered most appropriate " (See Standard Industrial Classification Manual, p.12, 1987).

explanations on why a segment's poor earnings prospects increase the likelihood of the segment becoming a divestiture candidate.

The first explanation is based on the change of investment opportunity and economies of scale argument (Linn and Rozeff 1983). The explanation rests on the argument that poor segment earnings provides a possibility that a return to normal profitability can be achieved by merging the resources into a buyer's organization. As a result, the proceeds from selling the segment may exceed the present value of cash flows from continuing operations if the buyer can extract more rent from the segment due to economies of scale or other synergistic gains from the merger. This explanation leads to a prediction that poor earnings prospects increase the likelihood of divestitures.

The second explanation is based on constrained external financing. In this case, firms may use proceeds from selling segments with poor earnings prospects to finance segments with better growth opportunity. Consistent with this explanation for asset sales, Lamont (1997) reports evidence that divestitures of segments with poor earnings prospects increased dramatically for a sample oil firms after the oil price drop in 1986. If external financing were not constrained, oil firms would have continued to finance all existing projects even with the sudden drop of cash flows from oil segment. His empirical evidence is consistent with those firms facing constrained external financing in that proceeds from selling poorly performing assets were used to finance other operations. This constrained external financing explanation for asset sale predicts that segments with poor earnings prospects relative to other operations are more likely to become divestiture candidates if cash is need to grow more profitable operations.

The third explanation is based on the entrenched management argument (Boot

1992; Dial and Murphy 1995). These authors argue that incumbent managers are reluctant to divest unprofitable segments either because managers have vested interests in these assets or because doing so would convey a negative signal about their ability even though divestitures are positive net present value projects. The replacement managers, however, who do not have similar reason to hold onto these assets, would be more likely to divest quickly. According to this entrenched management hypothesis, management change increases the likelihood of disposition of unprofitable segments[9].

We use three variables to capture a segment's earnings prospects and growth opportunity: segment's operating return ($SROA^S$), segment's capital expenditure to asset ratio ($CAPRATIO^S$) and segment's market share ($MKSHARE^S$). Segment's operating return is used because it is the best predictor of the segment's future profitability. A lower capital expenditure to asset ratio may signal that the segment has poor growth opportunity. Industry organization theorists argue that there are strategic advantages associated with a segment's position in its industry (Ravenscraft and Scherer 1987). Segments with larger market shares have strategic advantages include monopolistic position, reputation and others. Thus segment's market share ($MKSHARE^S$) is included as an additional indicator of a segment's future earnings prospects.

We measure variable $SROA^S$ as the difference between a segment's operating return and the firm's overall operating return. We measure segment's operating return relative to other operations because both the constrained external financing and the entrenched management explanations for divestitures suggest that a segment that has

[9] Due to the cost of collecting data on management change for our full sample, we examine the effect of management change on divestitures using a smaller sample in Chapter 4.

relatively poorer earnings prospects relative to other operations is more likely to be a divestiture candidate[10]. However, the investment opportunity change explanation for divestitures suggests that likelihood of divestiture is higher for a segment that has poorer earnings prospects relative to its industry. We repeated our tests with this measure and the results are qualitatively similar. Thus we report only one set of results in the empirical section. Similarly variable $CAPRATIO^S$ is measured as the difference between a segment's capital expenditure to asset ratio and the firm's capital expenditure to assets ratio because prior research shows that firms' capital expenditures are quite firm-specific and vary considerably cross firms[11]. Segment's market share ($MKSHARE^S$) is measured as segment's sales divided by the aggregate sales of the segment's 3-digit SIC industry for all US firms on COMPUSTAT.

(4) Poor firm performance hypothesis

Poor firm performance may signal management's sub-optimal effort and/or sub-optimal investment decisions. Agency theory predicts that poor firm performance increases the likelihood of replacing incumbent managers and of divestitures if divestitures are necessary to correct suboptimal decisions in prior periods. Empirical evidence in prior studies is largely consistent with these predictions. Warner et al. (1988) provide empirical evidence that CEO turnovers are negatively related to firms' stock returns. Weisbach (1988) further shows that, when both accounting returns and stock

[10]We alternatively used segment's operating return alone; the empirical results were qualitatively similar to those reported in this paper.

[11] In earlier version of this study, we use of segment operating return and capital expenditure to asset ratio as alternative measures of segment's earnings prospects, the results are qualitatively similar to these reported in this paper regarding the effect of segment's earnings prospects on divestiture decisions.

returns are included as measures of firm performance, only accounting returns are significantly related to the likelihood of CEO turnover. Weisbach (1992) also finds that CEO turnover increases the likelihood of divesting bad acquisitions made in prior periods. In the spirit of agency theory and existing evidence, we predict that poor firm performance should increase the likelihood of divestitures[12].

We use two variables to capture firm performance. Our primary variable that represents firm performance is firm's operating return on assets (ROA^F) which is measured as operating income divided by total assets[13]. Our second variable that measures firm performance is the growth rate of sales ($SALEG^F$) from the prior year. We further adjust $SALEG^F$ by the Gross Domestic Product (GDP) deflators for both years to remove the effect of inflation.

(5) The distress/financing hypothesis

Firms may also sell assets to raise cash in order to avoid costs associated with financial distress or to substitute additional external financing[14]. Financial distress such as debt-covenant violation and bankruptcy proceedings are costly; firms facing potential distress are more likely to use the proceeds from asset sales to reduce their degree of

[12] We assume that CEO turnover is endogenous in this study. Due to the cost of collecting data on CEO turnover, we undertake a separate analysis of the effect of CEO turnover on divestitures using a smaller sample in Chapter 4.

[13] We do not use stock return as a measure of firm performance as our primary interest is assessing the usefulness of accounting information in predicting divestitures. We did explore the use of annual market-adjusted stock return as an additional measure of firm performance and find that stock return is not incremental useful beyond the accounting operating return.

[14] This hypothesis does not apply to these spin-offs that distribute 100% of the segment's shares to existing shareholders. Spin-offs generate cash proceeds if some percentage (usually 20%) of the shares is distributed to outside investors. Section 4.4 examines whether our results are affected by separating spin-offs from sell-offs.

leverage and/or to mitigate a working capital constraint.

The cash raised from asset sales may also be used as a substitute for external financing. Shleifer and Vishny (1992) show that asset sale can be a rational alternative to other forms of capital acquisition when a firm faces information asymmetry between management and outside creditors and investors. They argue that with information asymmetry on assets in place issuing equity may be too costly or impossible, and the advantage of asset sale over other ways of obtaining cash in financial distress comes from a lower level of the information asymmetry with informed industry buyers than with equity investors.

This distress/financing hypothesis predicts that the probability of divestiture is positively related to the likelihood of potential distress and/or the demand for external financing.

We choose three variables to test the distress/financing motives for divestitures: the change of working capital to asset ratio from the prior year ($\Delta WCRATIO^F$), leverage ratio ($LEVRG^F$) measured as total liability divided by total assets, and the demand for external financing ($EXFINANCE^F$). The first two variables have been used in prior studies as predictors of financial distress (e.g., Ohlson 1980). Leverage ratio has often been used as a proxy for the closeness to the violation of firm's debt covenants in the earnings management literature. We adjust firm's leverage ratio by its 3-digit industry median by considering the variation of leverage ratios across different industries. Firms with relatively high levels of debt are more likely to face financing constraints.

Similar to the one used by Dechow et al. (1996), our measure of a firm's demand for external financing is derived by first calculating the following ratio:

F-DEMAND=(Capital expenditures-Cash flow from operation)/Current assets

The value of 1/F-DEMAND provides an indication of the number of years that a firm can continue to internally fund its current level of capital expenditures assuming that all current assets can be converted into cash. As the value of F-DEMAND increases, the demand for external financing also increases. We create an indicator variable ($EXFINANCE^F$) to take a value 1 if a firm requires external financing within the next two years (F-DEMAND>0.5) and 0 otherwise.

The distress/financing hypothesis predicts that the likelihood of divestiture is positively related to firm's leverage ratio ($LEVRG^F$), demand for external financing ($EXFINANCE^F$) and negatively related to the change of working capital to asset ratio (Δ $WCRATIO^F$).

(6) The segment size hypothesis

The segment size hypothesis is based on the premise that there may be size-related transaction costs associated with the divestiture or acquisition of a segment's assets. Smaller segments have relatively lower financing costs to potential buyers, and this could increase the number of potential bidders on the assets. For the divesting firms, the loss of firm-specific investment on divested segment is likely to increase with the size of the segment. This may explain partly why spun-off segments are, on average, larger in size than sold-off segments. Palepu (1986) finds that smaller firms are more likely to become takeover targets than larger firms, and he interprets such evidence as being consistent with the transaction cost story. Our measure of segment size ($SIZE^S$) is segment sales

divided by the firm's aggregate sales[15].

(7) The control variable for firm size related mis-specification

As a control for mis-specification in the logistic model, firm size ($SIZE^F$) is also included since this variable has often been used in the existing literature to control for firm size related mis-specification. For example, Scott (1994) shows that firm size is positively related to management's voluntary disclosures. Ohlson (1980) reports that firm size is negatively related to the probability of financial distress. These findings in prior literature suggest that smaller firms are more likely to sell assets for distress/financing reasons than larger firms. However, firm size tends to be positively correlated to the firm's number of segments of businesses, which in turn should be positively related to the probability of segment divestitures. This suggests a positive relationship between divestiture likelihood and firm size. Therefore, *a priori* we can not predict unambiguously the effect of firm size on the likelihood of a segment's divestiture.

We summarize the six hypotheses, the variables and our measurements discussed above in Exhibit 3.1. Our dependent variable takes the value of 1 if a segment is divested in year t+1 and 0 otherwise. All independent variables are measured at the end of year t. The predicted sign of the independent variable indicates whether the independent variable increases or decreases the likelihood of the segment's divestiture.

[15] If the financing cost of acquiring a segment by potential buyers dominates the loss of firm-specific investment to the divesting firm, it is more appropriate to use the absolute size of a segment directly. We assume that the loss of firm-specific investment to the seller is more important in deciding which segment to divest. However, the results are similar when the natural logarithm of the segment sales is used.

Exhibit 3.1 A Summary of Hypotheses, Variables, Predicted Signs and Measurements

Hypotheses and Variables	P		Measurements of variables
1. Industry shock			
borne by the firm, $SHOCK^F$	+	=	(1) 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise. (2) 1/CUR.
borne by the segment, $SHOCK^S$	+	=	(1) 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise. (2) 1/CUR.
2. Corporate focus			
$FOCUS3^S$	+	=	1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise.
$FOCUS2^S$	+	=	1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise
$FOCUS1^S$	+	=	1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise.
3. Segment's poor earnings prospects			
Operating return, $SROA^S$	-	=	Segment's operating return – firm's operating return.
Growth opportunity, $CAPRATIO^S$	-	=	Segment's capital expenditure to asset ratio – firm's capital expenditure to assets ratio.
Segment's market share, $MKSHARE^S$	-	=	Segment's sales divided by aggregate sales of the segment's 3-digit SIC industry.
4. Poor firm performance			
Return on assets, ROA^F	-	=	Firm's operating income divided by total assets.
Growth rate of sales, $SALEG^F$	-	=	Change of sales from prior year divided by sales in prior year adjusted by the GNP deflators.
5. Distress/financing			
$\Delta WCRATIO^F$	-	=	Change of working capital to asset ratio from the prior year.
$LEVRG^F$	+	=	Industry adjusted ratio of total liability divided by total assets.
$EXFINANCE^F$	+	=	1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise.
6. Segment size			
$SIZE^S$	-	=	Segment's sales divided by firm's sales.
7. Control variable			
$SIZE^F$	?	=	Natural logarithm of book value of firm's total assets adjusted by GNP deflators.

3. SAMPLE SELECTION AND THE IDENTIFICATION OF SEGMENT DIVESTITURES

Our sample consists of all US multi-segment firms (with at least two segments of businesses) that are included in the 1995 COMPUSTAT Industry Segment File. The Industry Segment file contains firms that are still active in operation and has up to 7 years of segment data for each firm (from 1989 to 1995). For each segment, sales, operating income, depreciation expense, capital expenditure, identifiable assets as well as some other data items are reported. In addition, firms also assign each segment an identification number and two 4-digit SIC codes (at least one) that represent the industry or industries of the segment's product or services.

To identify divestitures of segments, we first match the segment identification numbers in a year with those of the previous year to detect the change of industry segments being reported for each firm. According to APB No. 30 on reporting the disposition of a segment of business, at the time of management's decision on the disposition of a segment, the operating results along with gains or losses from the disposition of the segment should be reported as results from discontinued operations on income statement. Management's decision on disposition also results in the discontinuance of the segment to be reported in the disclosures on segment information. Once a change of reported segments is detected, we retrieve the description and related data items of all segments for the year before the change and in the year of the change to determine whether the change was caused by a divestiture. Even though Statement No. 14 stresses the importance of inter-period comparability of segments being reported.

Managers sometimes re-define segments especially during mergers or other corporate changes. We identify a segment to be divested if the segment was discontinued as a reported segment and the rest of the segments are not re-defined in the subsequent year. To check whether other segments are re-defined or not, we use the following criterion: (1) the segment identification numbers remain unchanged for all continuing segments; and (2) the two SIC codes of all segments remain unchanged for the two consecutive years.

After our subsample of divested segments is identified, our control subsample consists of all continuing segments that were not divested in the subsequent year[16]. For each segment, the corresponding firm-specific data were drawn from 1995 COMPUSTAT annual tape. Segments that had no firm-level information to match with were deleted.

Using the above procedure, our divestiture subsample consists of 870 segment-year observations, and our control subsample consists of 22509 segment-year observations for our sample period from 1989 to 1994. To further identify whether the divestiture was a sell-off or a spin-off, we search the News Library and Annual Reports of the divestiture firms on LEXIS/NEXIS. The 870 divestitures consist of 809 sell-offs and 61 spin-offs. Given the smaller number of spin-offs in the divested segments, we combine sell-offs and spin-offs in the initial empirical analysis on the usefulness of segment information in predicting divestitures. We also analyze the difference between sold-off segments and spun-offs segments to further check the robustness of our results.

[16] Our subsample of divestitures does not include divestitures that involve only part of a segment's assets; therefore, to the extent that the control subsample includes segments with partial divestitures, it should bias our empirical results against the alternative that segment information is useful in predicting divestitures.

4. THE EMPIRICAL RESULTS

In this section, we first report the variation of divestiture frequencies and results from tests for industry clustering of divestiture rates over the sampling period in section 4.1. Section 4.2 reports results from univariate tests of independent variables and the results from logistic regressions in predicting divestitures one year prior to divestiture decisions. Section 4.3 reports the results when we perform our tests in predicting divestitures two years prior to management decisions. Section 4.4 reports results from univariate tests on the difference between sold-off segments and spun-off segments as well as the results from multinomial logistic regressions.

4.1 Variation of Divestiture Rates across Industries

Table 3.1 reports the frequencies of divestitures across 2-digit SIC industries on an annual basis. Panel A of Table 3.1 presents the distribution of divestiture frequencies based on 2-digit SIC industries of the divesting company. As shown in the last row of panel A, the number of firms with segment disposals in the subsequent year increases from 92 in 1989 to 160 in 1993 and then drops to 143 in 1994. Part of the increase is due to the fact that some firms that had divestitures in early years have subsequently undergone mergers, takeovers or bankruptcies. In order to show whether there is industry clustering in divestiture activity, the table is sorted in descending order by the percentage of firms with divestitures out of total number of firms in the same 2-digit SIC industries. In addition, to avoid the bias induced by small denominators, industries with less than five divestitures are separately shown at the bottom section of the table. As shown by the

percentage of firms with divestitures, industries such as Railroads, Metal mining, Retail stores, and General Merchandise have higher rates of divestitures than industries such as Paper and Forest Products, Insurance Carriers, Printing and Publishing and Electric Power have. The high percentages of divestitures in Retailing and General Merchandise are consistent with the effect of economic recession during the period from 1989 to 1992.

Similarly, we report in Panel B the variation of divestiture frequencies and rates across industries on annual basis using segment's 2-digit SIC code. The result indicates that industries such as Home Furniture Stores, Apparel/Accessory Store, Depository Institutions, Agriculture and Motion Pictures have relatively higher percentage of divestitures. In contrast, industries such as Printing and Publishing, Electric Power, Stone/Clay/Glass, Insurance Carriers, and Electrical have lower percentage of divestitures. We observe certain variation of divestiture rates to be consistent with industry effects during this period. Notable examples include segments in Retailing (Furniture store, Apparel, Retail stores, General merchandise and Non-durable goods), Financial Services (Depository Institutions, Real Estate) and Health Services.

To formally test whether the rates of divestitures vary across industries, we carry out a Chi-square test to assess the null hypothesis of no variation in divestiture activity across different industries during the sampling period. The null hypothesis is that the actual divestiture rate in each industry equals the expected divestiture rate in that industry, where the expected rate is that for the entire sample of firm-year observations or segment-year observations. The Chi-square test statistics are reported in Table 3.2. The Pearson Chi-square test statistic pertains to the difference between the actual and expected proportion of divestitures across industries, the likelihood ratio Chi-square test statistic

pertains to the ratio of the actual and expected proportions across industries. For both test statistics, the null hypothesis of no variation of divestiture rates across industries based on firm's primary SIC code is rejected at p-value of 0.001. Similarly, the null hypothesis of no variation of divestiture rates across industries based on segment's SIC code is rejected at p-value of 0.001. Therefore, the evidence here is consistent with the assertion that industry forces impact the variation of divestiture activity across industries. Our logistic regression model will test the effect of industry shock on the likelihood of segment divestitures.

4.2 Results from Tests on the Usefulness of Segment Information in Predicting Divestitures One Year Prior to Divestiture Decisions

4.2.1 Results from univariate tests of independent variables

Table 3.3 presents selected descriptive statistics on the divestiture subsample and the control subsample of continuing segments in the year preceding the year of divestitures[17]. For the divestiture subsample, mean (median) value of segment's assets is $754 (33.9) million compared to the mean value of $1239.0 (99.4) million for the control subsample. Therefore, the average size of divested segments in terms of assets is relatively smaller than that of continuing segments. The mean (median) value of segment operating income for divested segments is $13.0 (0.27) million compared to the mean (median) value of $75 (6.3) million for the continuing segments. Therefore, divested segments have poor earnings performance prior to their divestitures. For the divestiture

[17] The number of observations for both divestiture subsample and control subsample in estimating the logistic models was reduced due to missing data on independent variables.

subsample, mean (median) value of firms' total assets is $4202.5 (319.7) million. In contrast, the mean (median) value of assets is $5089.4 (488.8) million for firms in the control subsample. This indicates that average size of firms with segment divestitures in term of assets is smaller relative to the average size of firms in the control subsample. The mean (median) value of the number of lines of businesses for the divestiture sample is 3.5 (3), which is similar to that of 3.4 (3) for firms in the control subsample.

Table 3.4 reports the results on univariate tests of independent variables one year prior to divestiture decisions. The univariate procedure tests the equality of means and medians of each independent variable between the divestiture segments and control subsample of continuing segments. For the industry shock hypothesis, the equality of means (medians) of $SHOCK^F$ between the divested segments and control subsample of continuing segments can not be rejected (p=0.72). On the other hand, the mean value of $SHOCK^S$ for the divested segments is significantly higher than that for the control subsample of continuing segments (significance at 0.003 level). This is consistent with our hypothesis that divested segments are more likely to be in poorly-performing industries than continuing segments are.

For the three variables testing corporate focus hypothesis ($FOCUS3^S$, $FOCUS2^S$, $FOCUS1^S$), the means of these variables indicate that divestiture subsample has higher percentage of segments that are not in the firm's primary line of business than the control subsample of continuing segments measured at 3-, 2- and 1-digit levels. The equality of means between the divestiture and control subsamples is rejected for all three variables at the 1% level. This evidence is consistent with the corporate focus hypothesis.

For variables that measure the segment's earnings prospects and growth

opportunity, the mean (median) values of all three variables ($SROA^S$, $CAPRATIO^S$ and $MKSHARE^S$) are less for the divestiture subsample than the mean (median) values for the control subsample. Therefore, these variables indicate that divested segments have lower operating returns, fewer growth opportunities and lower market shares. The only test that is not statistically significant at the 5% level is on the equality of means for $CAPRATIO^S$ between the divestiture subsample and control subsample but the equality of medians is rejected at the 1% level. Taken together, these accounting measures indicate that divested segments have poor earnings prospects relative to continuing segments.

For the firm performance hypothesis, the univariate tests show that firms in the divestiture subsample have lower operating return (ROA^F) and lower growth rate of sales ($SALEG^F$), consistent with our predictions that poor firm performance is positively related to the likelihood of divestitures. For the primary measure of firm performance, the test rejects the equality of means of ROA^F between the two subsamples. However, for variable $SALEG^F$, the equality of means (medians) between the two subsamples is not rejected[18].

For the three variables that represent firm's distress/financing motives for divestiture ($LEVRG^F$, $\Delta WCRATIO^F$, $EXFINANCE^F$), the divestiture subsample has significantly greater mean of leverage ratio ($LEVRG^F$) than the control subsample. Contrary to our prediction, firms in divestiture subsample have lower demand for external finance ($EXFINANCE^F$) or working capital ($\Delta WCRATIO^F$) than firms in the control subsample even though the equality of means (medians) between the subsamples can not

[18] We also used alternative measure of growth rate of sales over a 3-year period. We find no significant difference between the two subsamples.

be rejected for both variables. Therefore, the evidence here is more consistent with some divestitures being motivated to repay debt rather than to substitute for external financing.

As already noted in the descriptive statistics, the ratio of segment's sales to the firm's sales ($SIZE^S$) is significantly less for the divested segments than that for the subsample of continuing segments. The average size of firms with divestitures ($SIZE^F$) is also smaller than average firm size in the control subsample. The tests reject the equality of means between the two subsamples for both variables at the 0.01 level.

In summary, the results from univariate tests on the independent variables between the divestiture and control subsamples are broadly consistent with the six hypotheses suggested in the existing literature. We now turn to our results from estimating logistic regression models to examine the incremental usefulness of segment disclosures.

4.2.2. Results from logistic regression models

Table 3.5 presents the Pearson correlation coefficients across independent variables. The correlation coefficients reveal some interesting insights about our predictions. The segment's operating return ($SROA^S$) is negatively correlated with $SHOCK^S$ (significance at 0.01 level), indicating that part of the poor performance of divested segment is related to the poor performance of the industry. Similarly, firm's operating return (ROA^F) is negatively correlated with $SHOCK^F$, which is consistent with an industry effect on firm performance. Both $SIZE^S$ and $MKSHARE^S$ are positively correlated with segment performance $SROA^S$. This is consistent with the notion that segment size and its market share in the industry influence the segment's profitability.

$SIZE^S$ is negatively correlated with $FOCUS3^S$, $FOCUS2^S$, $FOCUS1^S$. This is consistent with the fact that larger segments are likely to be in the firm's primary lines of business or those segments that are closely related to primary lines of business of the firm.

Table 3.6 reports several versions of coefficient estimates of the logistic regressions using maximum likelihood estimation. Model 1 includes independent variables at both the firm and segment levels. Model 2 includes only variables at the firm level. We first estimate Model 1 and Model 2 using the full sample of divestitures. In addition, we estimate Model 3 that includes variables at the firm level and variables with segment's industry attributes. Comparing results from Model 1 and Model 2 is a test of the overall information content of segment information on its own; comparing results from Model 3 and Model 1 should provide an indication of the significance of segment accounting data in predicting divestitures. The latter provides a harsher test on the incremental usefulness of segment information because this information is not available anywhere else. We also present in the last two columns the results from estimating Model 1 and Model 2 using the sample of segments and firms located in Manufacturing, Mining and Utilities.

The first two columns show the coefficient estimates and related statistics for Model 1 and Model 2 using the full sample. The likelihood ratio test statistics are significant for both models at the 1% level, indicating that Model 1 and Model 2 provide statistically significant explanation of divestiture decisions in the subsequent year. Also presented is the likelihood ratio index[19], which provides an indication of the overall

[19] The likelihood ratio index =(1-(log-likelihood value at convergence/log-likelihood value at zero)).

explanatory power of a model. The likelihood ratio index increases from 1% of Model 2 to 9.4% of Model 1, suggesting that including independent variables that use segment information improves the model's goodness-of-fit. An additional indication of the goodness-of-fit of the model is the ability of the model to discriminate between divested and continuing segments; a model with better ability to discriminate divested and continuing segments is indicated by a higher percentage of concordant pairs. As we introduce segment variables into Model 2, the percentage of concordant pairs increases from 56% to 72%. To test for the incremental usefulness of segment information as a group, our likelihood ratio test statistic, in comparing Model 1 and Model 2, has a value of 577.6, which is significant at the 1% level. This suggests that segment information as a group is useful in predicting divestiture decisions controlling for the use of aggregate information. We further test the incremental usefulness of segment accounting data by comparing results from Model 1 and Model 3, our likelihood ratio test statistic for the joint significance of segment accounting data has a value of 54.2 with 4 degrees of freedom, which is significant at the 1% level. This indicates that segment accounting data are incrementally useful in predicting divestitures and this information is not available from any other source.

We now turn to the coefficient estimates of independent variables in Model 1. For the two variables testing the industry shock hypothesis, the coefficient of variable $SHOCK^S$ is positive and statistically significant (t=2.32), suggesting that the likelihood of segment divestiture is positively related to the existence of industry shock in the segment's line of business. In contrast, coefficient of variable $SHOCK^F$ is not statistically significant (t=0.78), indicating that the probability of divestitures is not related to the

existence of industry shock in the firm's primary line of business. Therefore, industry effect on the likelihood of a segment's divestiture is captured more directly by the segment of business than by the firm's primary line of business.

The corporate focus hypothesis suggests that segment divestiture is positively related to the un-relatedness of segment's line of business to the firm's primary line of business. The estimated coefficients for all three variables $FOCUS1^S$, $FOCUS2^S$, $FOCUS3^S$ are positive and statistically significant, which are consistent with the corporate focus hypothesis. Furthermore, the positive and significant coefficients of $FOCUS2^S$ and $FOCUS1^S$ suggest that the effect of focus on the likelihood of divestiture increases with the un-relatedness of a segment's line of business to the firm's primary line of business.

Our hypothesis of the relationship between segment's earnings prospects and the likelihood of segment divestitures predicts negative coefficient estimates for variables $SROA^S$, $CAPRATIO^S$ and $MKSHARE^S$. The estimated coefficients for variables $SROA^S$, $CAPRATIO^S$ and $MKSHARE^S$ are consistent with our predictions that divestiture probability is negatively related to segment's performance ($SROA^S$), growth opportunity ($CAPRATIO^S$) relative to other operations and segment's market share ($MKSHARE^S$). Together the estimated coefficients suggest a negative relationship between segments' earnings prospects and the likelihood of divestitures in the subsequent year. The *t*-values of the estimated coefficients of $SROA^S$ and $MKSHARE^S$ are significant at the 5% level; but the *t*-value of the estimated coefficient of $CAPRATIO^S$ is not significant.

For variables testing the effects of firm performance on divestitures, the estimated coefficients of firm's operating return (ROA^F) and growth rate of sales ($SALEG^F$) are

negative, consistent with agency theory based prediction that poor firm performance increases the likelihood of subsequent divestitures as corrections of suboptimal investment decisions in prior periods. The estimated coefficient of variable ROA^F is statistically significant, suggesting that poor firm performance increases the likelihood of divestiture. The estimated coefficient of $SALE^F$ is not statistically significant, which is consistent with the insignificant result in the univariate test.

The distress/financing hypothesis predicts positive coefficients for $LEVRG^F$ and $EXFINANCE^F$, but a negative coefficient for $\Delta WCRATIO^F$. The estimated coefficient of firm's leverage ratio ($LEVRG^F$) is positive and statistically significant, suggesting that high leverage ratio increases the probability of divestitures with other things being constant. This positive relationship implies that part of the proceeds from divestitures has been used to reduce leverage and the likelihood of potential distress[20]. On the other hand, the estimated coefficients on the change of working capital to asset ratio ($\Delta WCRATIO^F$) and demand for external finance ($EXFINANCE^F$) are contrary to our predictions. While the estimated coefficient for variable $\Delta WCRATIO^F$ is not significant, the estimated coefficient on variable $EXFINANCE^F$ is statistically significant, suggesting that divestitures are negatively related to the firm's demand for external financing. A possible explanation for this result is that firms with subsequent divestitures cut back their capital expenditure in the face of poor firm performance and potential distress.

The segment size hypothesis predicts a negative relationship between the

[20] To verify whether some divestiture proceeds were used to repay debt, we find that the industry adjusted leverage ratio is 0.061 in the year of divestiture, significantly lower than that in the year preceding divestitures (p-value=0.00).

likelihood of divestiture and segment size. The estimated coefficient of segment size ($SIZE^S$) has a negative coefficient and is statistically significant at the 1% level, suggesting that divestiture probability decreases with the size of the segment. In contrast, the estimated coefficient of the control variable $SIZE^F$ is not statistically significant in both Model 1 and Model 2, suggesting that firm size has no marginal effect on the divestiture decisions controlling for other variables in the model.

In summary, our results from logistic regression, taken together, are consistent with the assertion that divestitures are related to forces originating at industry, firm and segment levels. Therefore, these findings suggest that industry, firm and segment information complement each other in predicting divestiture decisions. Our tests on the usefulness of segment information reject the null hypothesis that segment information is not incrementally useful in predicting divestitures.

We re-estimate Model 1 and Model 2 using a sample of segments and firms located in Manufacturing, Mining and Utilities during our sampling period. Although smaller, this sample allows the use of the measure of industry shock (1/CUR) that is most closely related to Jensen (1993)'s notion of industry excess capacity; therefore this is a direct test of the effect of industry excess capacity on the likelihood of segment divestiture. This also allows a check of whether the results are robust to the change of sample size.

As shown in the last two columns of Table 3.6, the estimated coefficient of $SHOCK^S$ is positive and statistically significant at the 5% level; in contrast, the coefficient of $SHOCK^F$ is negative and statistically insignificant. The evidence here is consistent with Jensen's (1993) hypothesis that industry excess capacity increases the

likelihood of divestitures. Also we find that the likelihood of divestiture is positively related to the degree of industry excess capacity in the segments' line of business but are not related to the degree of industry excess capacity in the firms' primary line of business. The estimated coefficients for Model 1 and Model 2 by using the small sample of divestitures and non-divestiture segments located in these industries are largely consistent with those by using the full sample. Our test for the incremental usefulness of segment information yields a Chi-square statistic value of 322.0, which is significant at the 1% level. Therefore, the empirical test supports that segment information is useful in predicting divestitures when we use industry excess capacity as our measure of the industry shock and a smaller sample.

4.3 Results from Tests on the Usefulness of Segment Information in Predicting Divestitures Two Years Prior to Divestiture Decisions

We also perform univariate tests of independent variables and estimation of our logistic models in predicting divestitures two years prior to management decisions conditioning on the fact that the segments were not divested in the subsequent year. The main objective of performing these tests in two years prior to management decisions is to alleviate a concern that our findings above may capture a bias in reporting segment information in the year prior to divestitures. Our divestiture subsample now consists of segments that existed during 1989 to 1993 but were divested in years from 1991 to 1995 respectively. Our control subsample now consists of segment of business existed during 1989 to 1993 and not being divested in any of the subsequent two years.

Comparing the means (medians) of independent variables between the two

divestiture subsamples in table 3.7 and in table 3.4 suggests that there is a trend of deterioration in the accounting measures of firm performance, leverage ratio and segment performance from year –2 to year –1. Specifically, the mean values of $SROA^S$ and $CAPRATIO^S$ decrease from year –2 to year –1; Similarly, the mean value of ROA^F decreases from year –2 to year –1 for firms with segment divestitures. In addition, the mean value of $LEVRG^F$ increases from year –2 to year –1 for firms with divestitures. This evidence lends additional support to our interpretation of the positive relationship between divestitures and leverage ratio as evidence of some divestitures being motivated to reduce firm's leverage ratio. The results from univariate tests on the equality of independent variables are qualitatively similar to those in table 3.4 as discussed before.

Table 3.8 reports the coefficient estimates of the logistic models in predicting divestitures two years prior to segment divestitures. Similar to those in Table 3.6, we estimate Model 1 and Model 2 first using the full sample and then using a sample of segments (firms) in Manufacturing, Mining and Utilities. The results are again broadly consistent with those reported in Table 3.6. Both Model 1 and Model 2 are statistically significant in predicting divestitures two years prior to divestitures as indicated by the likelihood ratio test statistics, which are significant for Model 1 and Model 2. Comparing with those in Table 3.6, the overall predictive power of independent variables appear to be lower for both Model 1 and Model 2 as we move our prediction from year –1 to year –2. However, the estimated coefficients on all independent variables of Model 1 are similar in magnitudes with those reported in Table 3.6 even though the *t*-values of the coefficients are in generally lower when we estimate the model in year –2. Only variable $SALEG^F$ has a change in sign, but the coefficient is not statistically significant.

The last two columns report estimated coefficients using 1/CUR as our measure of degree of industry excess capacity using a sample of segments and firms located in Manufacturing, Mining and Utilities. We continue to find that divestitures are positively related to the industry excess capacity in the segment line of business rather than in the firm's primary line of business.

In summary, our results from the univariate tests and from the logistic regressions in predicting divestitures two years prior to divestitures are broadly consistent with the results in predicting divestitures one year prior to divestitures. The empirical tests continue to show that segment information is useful in predicting divestitures even two years prior to management decisions. Therefore, our findings on usefulness of segment information in predicting divestitures are unlikely to be caused by a management bias in reporting segment information just prior to divestiture decisions.

4.4 The Results from Multinomial Logistic Regressions

We have so far combined spin-offs and sell-offs in our empirical tests on the usefulness of segment information in predicting divestitures. Firm's decision to spin-off a segment of business rather than to sell the assets to another buyer is likely to be dependent on the attributes of the segment. As a result, we undertake a further examination of the differences of attributes between sold-off segments and spun-off segments. We also report our results from separate logistic regressions of sell-offs and spin-offs. Finally, we examine the results from multinomial logistic regressions that take into consideration the fact that segment divestiture is a three-choice decision that includes sell-off, spin-off and continuing operation of the segment within the firm.

Table 3.9 reports the results of univariate tests of independent variables between the sold-off segments and spun-off segments. The results show that spun-off segments have, on average, better earnings prospects than sold-off segments. The means of $SROA^S$ and $MKSHARE^S$ of the spun-off segments are significantly larger than those of the sold-off segments. Furthermore, spun-off segments have better growth opportunity as $CAPRATIO^S$ is higher for the spun-off segments than for sold-off segments. $SIZE^F$ shows that average firm size is significantly larger for firms with spin-offs than for firms with sell-offs. In addition, ROA^F is significantly higher for firms with spin-offs than that for firms with sell-offs. Therefore, firms that have spin-offs tend to be larger in size and have better earnings performance than firms that have sell-offs.

Table 3.10 reports the results from separate logistic regressions of sell-offs and spin-offs. We present these results from separate logistic regressions to compare with our prior results when sell-offs and spin-offs are combined. Since our sample of divestitures are dominated by sell-offs (93%). Excluding the spin-offs is not likely to have major changes on our prior results on the estimated coefficients. As shown in the table, the results from logistic regression of the sell-offs alone are largely consistent with our prior results reported in table 3.6 when sell-offs and spin-offs are combined.

For the result from logistic regression with spun-off segments, we find that the likelihood of spin-off increases in the un-relatedness of the segment to the firm's primary line of business ($FOCUS3^S$), firm's leverage ratio ($LEVRG^F$) and firm size ($SIZE^F$). The coefficient estimates of other independent variables are insignificant in predicting spin-offs. A major reason for the lack of significance is the small number of spin-offs in our sample of divestitures.

Table 3.11 presents the coefficient estimates of multinomial logistic regressions. The multinomial logistic regression treats a segment's outcome as one of three choices that include sell-off, spin-off and continuing operation within the firm. The multinomial logistic regression estimates separate vectors of coefficients for sell-offs and spin-offs against the choice of continuing operation within the firm. The first two columns contains the results of multinomial logistic regression for our full sample. As shown in the first column of estimated coefficients, the signs and estimates for the sell-offs are similar to these results when sell-offs and spin-offs are combined. For the spin-off segments, the only variables that are significant are firm performance (ROA^F), the size of the segment ($SIZE^S$) and the size of the firm ($SIZE^F$). Even though the coefficient estimates of $FOCUS3^S$, $FOCUS2^S$ and $FOCUS1^S$ are insignificant, their positive signs continue to suggest that un-related segments are more likely to be spun-off candidates. Comparing the coefficient estimates for variables that represent segment's earnings prospects $SROA^S$, $CAPRATIO^S$ and $MKSHARE^S$ between the sell-offs and spin-offs suggests that the effects of segment's earnings prospects on the likelihood of divestitures are different between sell-offs and spin-offs. Spun-off segments appear to have earnings prospects that are not significantly different from continuing segments. This is consistent with economic reality that spun-off segments are just continuing segments in a different organizational form. The last two columns of the table reports results of multinomial logistic regression for the sample of firms and segments located in Manufacturing, Mining and Utilities. The results are largely consistent with those reported in the first two columns.

To summarize our results from separate examination of sell-offs and spin-offs and the results from multinomial logistic regressions, we find that spun-offs segments have

better earnings prospects and are associated with firms that are relatively larger in size and have better earnings performance than sold-off segments. However, taking into consideration the difference between sell-offs and spin-offs, our results from multinomial logistic regressions are largely consistent with our prior results on the usefulness of segment information in predicting divestitures. Taken together, our results on the usefulness of segment information continue to demonstrate that divestitures are caused by economic stimuli originating from the industry, firm and segment levels, and that segment information is useful in predicting divestitures controlling for the use of aggregate information.

5. SUMMARY AND CONCLUSIONS

This chapter reports results from an empirical study on the usefulness of segment information in predicting divestitures controlling for the use of aggregate information. Our empirical results support the assertion that divestitures are driven by forces originating at the industry, firm and segment levels. Our findings suggest that industry, firm-specific, and segment information complement each other in predicting divestitures. The empirical tests indicate that segment information is incrementally useful in predicting divestitures one year as well as two years prior to management decisions. Therefore, despite wide-spread concern on the quality of segment disclosures by analysts and academic accountants, our results suggest that segment disclosures provide useful information in predicting divestitures.

This paper also documents interesting empirical evidence on factors that influence divestiture decisions. First, segment divestitures are influenced by industry shock

measured either by industry performance or the degree of excess capacity in the segment's line of business, but not in the firm's primary line of business. Secondly, the likelihood of divestiture increases in the un-relatedness of the segment's line of business to the firm's primary line of business. Thirdly, we find that the likelihood of segment divestitures is negatively related to its earnings prospects and growth opportunities relative to other operations within the firm. Finally, we find that the likelihood of divestiture is negatively related to firm performance, positively related to potential distress but not related to the demand for external financing.

The results of this study should be of interest to US and Canadian standard setters in assessing the benefits and costs of alternative approaches for segment reporting. First, we show that segment's industry attributes and accounting data are useful in predicting divestitures, which suggests that there are potential costs associated with the change of industry approach to segment reporting. At least new accounting standard should still require management to disclose industry attributes in segment reporting. Second, the results of this paper highlight the importance of segment information in predicting a major managerial decision on resource allocation---segment divestiture. Future research can utilize the results of this paper to assess how the replacement of SFAS No. 14 changes the usefulness of segment information in predicting divestitures given the popularity of divestitures in the 1980s and 1990s.

Finally, this study is also of interest to accounting researchers studying the usefulness of accounting information in predicting other types of corporate changes as well as stock returns.

Table 3.1 Annual Distribution of Divestitures across 2-digit SIC Industries

Panel A: This table reports the frequency of divestitures in the subsequent year across 2-digit SIC industries based on divesting firm's primary SIC code. A divestiture is assigned to a year if the divestiture decision occurs in the next fiscal year.

Two digit SIC code & Name		89	90	91	92	93	94*	Total	%
40	Railroads	2	1	0	0	1	3	7	18.4
10	Metal mining	2	0	1	1	1	1	6	16.7
59	Retail stores	3	1	2	3	1	2	12	16.4
82	Educational services	0	0	0	2	3	1	6	15.0
53	General merchandise	1	0	2	1	3	2	9	14.7
79	Amusements	1	1	2	1	6	2	13	14.4
01-8	Agriculture	1	0	1	1	0	4	7	14.0
72	Personal services	1	0	0	0	2	2	5	13.5
23	Apparel	0	0	2	2	0	1	5	12.8
64	Insurance agents	0	1	1	0	0	3	5	12.8
67	Holding comp.	1	2	2	1	2	1	9	12.2
51	Non-durable goods	4	4	5	4	6	2	25	11.4
30	Rubber & plastics	1	5	3	5	4	5	23	11.4
39	Misc.manufact industry	1	1	2	5	2	6	17	11.3
87	Professional services	2	4	2	4	4	3	19	11.2
16	Heavy construction	1	1	1	0	2	1	6	11.1
54	Food stores	0	0	3	0	1	1	5	11.1
13	Oil & gas exploration	7	5	9	2	4	5	32	10.5
28	Chemical &allied prods	7	6	7	9	9	11	49	10.3
44	Water transportation	0	1	2	0	0	2	5	10.2
50	Durablegoods wholesale	3	4	7	2	5	3	24	10.1
48	Electric and gas service	0	4	4	5	5	4	22	9.7
36	Electrical equip comput	8	7	8	11	8	7	49	9.6
32	Stone/clay/glass	1	2	1	4	1	2	11	9.6
34	Fabric metal ex machin.	8	8	2	5	6	6	35	9.5
58	Restaurant	1	3	0	2	2	1	9	9.3
22	Textile mill products.	1	1	1	2	1	1	7	9.3
38	Meas inst.photo.watch	4	5	2	12	8	2	33	9.2
20	Food and kindred prods.	4	2	2	6	4	4	22	9.1
61	Nondepository creditins.	1	1	4	1	6	2	15	9.1
80	Health services	1	2	2	1	3	1	10	9.1
62	Security brokers	0	3	2	0	1	1	7	9.1
33	Primary metal industry	2	2	3	5	3	2	17	8.5
73	Business services	3	1	4	3	5	5	21	8.3
17	Special trades constru.	0	1	1	1	2	0	5	8.2
29	Petroleum refining	2	3	1	2	2	3	13	7.7
65	Real estate	0	3	1	1	2	2	9	7.4
37	Automobile	2	3	4	6	6	4	25	7.1
35	Computer indl machin.	2	2	9	9	11	10	43	7.0
24	Forest Products	0	0	0	2	0	4	6	6.7
15	Bldg construction	0	0	0	1	4	1	6	5.5
49	Electric power	5	3	8	8	8	5	37	5.2
27	Printing & publishing	3	1	0	3	1	1	9	4.9
63	Insurance carriers	0	3	6	4	2	4	19	4.8
26	Paper & forest products	1	1	0	2	3	1	8	4.5
21	Tobacco products	0	0	0	1	2	1	4	15.4
56	Apparel/accessory store	1	0	0	0	3	0	4	10.0
14	Nonmetal mining	1	0	1	1	1	0	4	8.9
78	Motion pictures	1	0	1	1	1	0	4	7.0
57	Home furniture stores	1	0	1	0	0	1	3	27.3
99	Nonclassified	1	1	1	0	0	0	3	12.5
55	Auto dealers	0	0	0	0	0	3	3	12.0
25	Furniture & Fixture	0	0	0	2	1	0	3	4.9
76	Misc. repair	0	1	0	0	1	0	2	18.2
31	Leather	0	0	0	0	1	1	2	16.7
42	Motor freight	0	0	0	0	0	2	2	5.7
47	Transportation services	0	1	1	0	0	0	2	5.1
75	Auto repair	0	1	0	1	0	0	2	4.9
52	Bldg matl, hardware	0	0	0	0	0	1	1	50.0
83	Social services	0	0	1	0	0	0	1	20.0
45	Air transportation	0	1	0	0	0	0	1	4.3
Total		92	103	125	145	160	143	768	8.7

Panel B: This table reports the annual distribution of divestitures across 2-digit SIC industries based on the SIC code of the segment's line of business. A divestiture is assigned to the year if the divestiture decision occurs in the next fiscal year.

Two digit SIC code & Name		89	90	91	92	93	94	Total	%
57	Home furniture stores	1	2	1	1	0	2	7	12.1
56	Apparel/accessory store	0	0	3	2	0	6	11	9.8
60	Depository institutions	0	2	1	2	4	2	11	8.8
01-09	Agriculture	0	2	3	2	4	3	14	7.5
78	Motion pictures	0	2	2	2	0	3	9	6.6
87	Professional services	4	5	5	9	7	5	35	6.3
59	Retail stores	2	3	2	4	1	2	14	6.1
75	Auto repairs	0	0	0	1	2	2	5	6.0
25	Furniture & Fixture	0	1	1	0	0	5	7	5.8
23	Apparel	1	0	1	1	5	0	8	5.6
10	Metal mining	2	1	0	0	1	2	6	5.6
53	General merchandise	1	1	2	0	2	0	6	5.5
45	Air transportation	0	0	0	1	4	0	5	5.5
12	Coal mining	0	0	5	1	1	1	8	5.3
65	Real estate	2	6	7	3	10	7	35	5.1
73	Business services	5	5	8	12	5	10	45	5.0
80	Health services	0	2	1	2	4	4	13	4.9
14	Nonmetal mining	1	0	1	1	0	2	5	4.9
13	Oil & gas exploration	11	5	8	11	9	8	52	4.8
44	Water transportation	0	4	1	0	0	0	5	4.5
15	Bldg construction	0	1	4	2	2	3	12	4.4
22	Textile mill products.	0	1	3	2	2	0	8	4.4
33	Primary metal industry	4	4	2	5	1	2	18	4.3
70	Hotels	0	1	1	1	2	1	6	4.3
51	Non-durable goods	5	3	3	4	1	5	21	4.2
39	Misc.manufact industry	1	1	2	3	2	2	11	4.2
16	Heavy construction	0	2	0	0	2	1	5	4.2
50	Durablegoods wholesale	2	3	5	6	5	7	28	4.1
20	Food and kindred prods.	2	3	6	3	2	4	20	4.1
67	Holding comp.	1	0	5	3	5	1	15	3.9
38	Meas inst.photo,watch	5	6	3	8	7	6	35	3.7
37	Automobile	7	4	6	2	5	6	30	3.7
34	Fabric metal ex machin.	5	7	2	7	7	1	29	3.4
48	Electric and gas service	2	4	2	5	2	7	22	3.4
62	Security brokers	0	1	5	1	2	0	9	3.4
35	Computer indl machin.	5	7	9	13	9	9	52	3.3
24	Forest Products	1	0	2	2	0	4	9	3.3
30	Rubber & plastics	2	3	1	3	3	6	18	3.2
58	Restaurant	1	0	0	1	4	0	6	3.2
64	Insurance agents	0	2	1	0	1	1	5	3.2
61	Nondepository creditins.	0	6	5	2	6	2	21	3.1
26	Paper &forest products	0	2	1	3	3	5	14	3.1
79	Amusements	2	1	0	1	1	0	5	2.8
28	Chemical &allied prods	6	3	6	6	6	5	32	2.7
36	Electrical equip comput	5	6	4	5	5	4	29	2.7
63	Insurance carriers	2	3	6	4	7	11	33	2.6
32	Stone/clay/glass	2	0	1	2	3	0	8	2.5
49	Electric power	1	3	8	5	9	1	27	1.8
27	Printing & publishing	2	0	0	1	2	2	7	1.5
82	Educational services	1	0	1	0	1	1	4	5.8
17	Special trades constru.	0	0	2	0	2	0	4	3.5
47	Transportation services	1	0	1	1	1	0	4	3.4
29	Petroleum refining	0	1	0	1	0	2	4	1.7
31	Leather	1	0	0	1	1	0	3	5.6
76	Misc. repairs	0	0	1	0	2	0	3	5.0
42	Motor freight	0	0	0	2	1	0	3	2.3
40	Railroads	0	2	0	0	0	0	2	4.3
72	Personal services	0	0	0	0	1	1	2	3.4
86	Communication service	0	0	0	0	1	0	1	7.7
52	Bldg matl, hardware	0	0	1	0	0	0	1	4.5
46	Pipe line, natural gas	0	0	0	1	0	0	1	3.0
54	Food stores	0	0	0	0	1	0	1	1.7
55	Auto dealers	0	0	0	1	0	0	1	1.5
Total		96	121	151	162	176	164	870	3.7

Table 3.2
Tests for Variations of Divestiture Rates across 2-digit SIC Industries

This table reports the results from tests assessing the null of no variation in divestiture rate across 2-digit SIC industries during the 1989-1994 period. **Pearson** refers to the Pearson Chi-square statistic which pertains to the difference between the actual and the expected proportions of divestitures across industries: $Q_P=\Sigma_i\Sigma_j(\text{Actual}_{ij} - \text{Expected}_{ij})^2/\text{Expected}_{ij}$. **Likelihood Ratio** refers to the Likelihood ratio Chi-square statistic which pertains to the ratio of the actual and expected proportions across industries: $L_2=2\Sigma_i\Sigma_j\text{Actual}_{ij}\ \ln(\text{Actual}_{ij}/\text{Expected}_{ij})$.

Category	**Pearson**			**Likelihood Ratio**		
	Q_P	D.F.	Probability value	L_2	D.F.	Probability value
Divestiture rates based on firm's SIC code	86.70	61	0.001	87.86	61	0.001
Divestiture rates based on segment's SIC code	136.9	63	0.001	185.4	63	0.001

Table 3.3
Descriptive Statistics of Divestiture Subsample and the Control Subsample

	Mean	Std. Dev.	First Quartile	Median	Third Quartile
Panel A: Divestiture subsample (N=806)					
Segment's assets ($mil)	754.1	5113.8	6.7	33.9	215.8
Segment's sales ($mil)	330.6	1111.3	5.9	35.0	197.2
Segment's operating earnings (mil)	13.0	99.2	-1.0	0.27	8.6
Firm's assets ($mil)	4202.5	15574.9	56.9	319.7	1986.3
Firm's sales ($mil)	2380.6	5788.3	64.6	295.6	1917.4
Firm's number of segments	3.5	1.5	2.0	3.0	4.0
Panel B: Control subsample (N=21418)					
Segment's assets ($mil)	1239.0	5719.0	15.6	99.4	568.4
Segment's sales ($mil)	802.1	3456.4	15.6	98.2	496.3
Segment's operating earnings ($mil)	75.0	301.0	0.3	6.3	43.7
Firm's assets ($mil)	5089.4	17687.4	69.1	488.8	2827.4
Firm's sales ($mil)	2840.1	8059.8	73.3	466.5	1091.7
Firm's number of segments	3.4	1.4	2.0	3.0	4.0

Table 3.4 Univariate Tests of Independent Variables One Year Prior to Divestitures

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflators. *P*-values are in parentheses.

Hypotheses	**Variables**	**Prd**	**Divestiture subsample (N=806)**		**Control subsample (N=21418)**		***t*-test statistic (Wilcoxon Z) for differences in**	
			Mean	Median	Mean	Median	Mean	Median
Industry shock	$SHOCK^F$	+	0.259	0	0.265	0	-0.36 (0.72)	-0.36 (0.72)
	$SHOCK^S$	+	0.330	0	0.280	0	**2.99 (0.003)**	**3.12 (0.002)**
Focus	$FOCUS3^S$	+	0.930	1	0.610	1	**33.61 (0.001)**	**18.30 (0.001)**
	$FOCUS2^S$	+	0.840	1	0.470	0	**27.30 (0.001)**	**20.51 (0.001)**
	$FOCUS1^S$	+	0.624	1	0.312	0	**17.97 (0.001)**	**18.60 (0.001)**
Segment earnings prospects	$SROA^S$	-	-0.138	-0.026	0.030	0.015	**-4.10 (0.001)**	**-11.40 (0.001)**
	$CAPRATIO^S$	-	-0.002	-0.004	0.002	0.001	-0.95 (0.340)	**-3.66 (0.001)**
	$MKSHARE^S$	-	0.030	0.030	0.040	0.07	**-5.30 (0.001)**	**-7.18 (0.001)**
Firm performance	ROA^F	-	0.025	0.052	0.056	0.069	**-6.12 (0.001)**	**-8.15 (0.001)**
	$SALEG^F$	-	0.064	0.049	0.065	0.055	-0.49 (0.62)	-1.36 (0.18)
Distress/ financing	$LEVRG^F$	+	0.082	0.049	0.036	0.018	**4.83 (0.001)**	**4.93 (0.001)**
	$\Delta WCRATIO^F$	-	-0.032	0.000	-0.033	0.000	0.16 (0.87)	0.49 (0.62)
	$EXFINANCE^F$	+	0.159	0	0.170	0	-0.93 (0.350)	-0.90 (0.370)
Segment size	$SIZE^S$	-	0.210	0.135	0.357	0.278	**-18.70 (0.001)**	**-15.50 (0.001)**
Firm size	$SIZE^F$	+/-	5.780	5.760	6.080	6.160	**-3.43 (0.001)**	**-3.63 (0.001)**

Table 3.5 Pearson Correlation Coefficients across the Independent Variables
(See table 2.4 for definition of variables)
N=22224

	SHOCK^F	SHOCK^S	SROA^S	CAPRATIO^S	MKSHARE^S	FOCUS3^S	FOCUS2^S	FOCUS1^S	ROA^F	SALEG^F	LEVRG^F	ΔWCRATIO^F	EXFINANCE^F	SIZE^S
SHOCK^S	.460													
SROA^S	.003	-.090												
CAPRATIO^S	.000	.007	-.000											
MKSHARE^S	-.004	-.030	.016	-.008										
FOCUS3^S	-.004	.020	-.028	-.007	-.007									
FOCUS2^S	.000	.011	-.020	-.007	-.023	.750								
FOCUS1^S	.011	.075	-.016	.002	-.040	.540	.714							
ROA^F	-.110	-.086	.034	-.008	.146	-.008	-.040	-.076						
SALEG^F	-.040	-.030	-.017	.005	-.021	.007	.025	.041	.056					
LEVRG^F	.018	.009	-.005	.001	.076	-.005	.002	.004	-.163	-.081				
ΔWCRATIO^F	-.020	-.019	-.007	.002	.030	.022	.017	.014	.131	.396	-.140			
EXFINANCE^F	.330	.244	-.020	.003	-.016	.008	.006	.003	-.239	-.011	.070	-.070		
SIZE^S	-.040	-.063	.050	-.026	.098	-.560	-.480	-.370	-.038	-.006	-.026	-.019	-.054	
SIZE^F	.130	.093	-.018	.012	.104	.070	-.030	-.057	.155	-.057	.100	.061	.194	-.170

Notes: Pearson correlation coefficient >0.017 or <-0.017 is significant at 0.01 level, Pearson correlation coefficient>0.013 or <-0.013 is significant at 0.05 level Pearson correlation coefficient >0.011 or <-0.011 is significant at 0.10 level.

Table 3.6 Results of Logistic Regressions One Year Prior to Divestitures

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^F$ is 1/CUR of the firm's industry using the sample of Manufacturing Mining and Utilities.$SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. SHOCK' is 1/CUR of the segment's industry using the sample of Manufacturing Mining and Utilities. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflator. *** indicates significance at 0.01 , ** indicates significance at 0.05 and * indicates significance at 0.1 levels.

Hypothesis	Variables	Pd	Full sample 1989-1994			Manufacturing, Mining and Utilities 1989-1994	
			Model 1	Model 2	Model 3	Model 1	Model 2
	INTERCEPT	-	-4.44	-3.12	-4.87	-4.97	-3.67
			(22.02)***	(32.54)***	(30.4)***	(4.56)***	(3.61)***
Industry shock	$SHOCK^F$	+	-0.04	-0.01	-0.03	-0.20	-0.21
			(0.78)	(0.09)	(0.3)	(0.25)	(0.28)
	$SHOCK^S$	+	0.19		0.20	1.18	
			(2.32)**		(2.52)***	(2.57)***	
Focus	$FOCUS3^S$	+	1.17		1.38	1.06	
			(6.35)***		(7.72)***	(4.57)***	
	$FOCUS2^S$	+	0.66		0.68	0.48	
			(4.65)***		(4.85)***	(2.76)***	
	$FOCUS1^S$	+	0.28		0.32	0.43	
			(3.02)***		(3.52)***	(3.05)***	
Segment earnings prospects	$SROA^S$	-	-0.171			-0.25	
			(4.68)***			(3.84)***	
	$CAPRATIO^S$	-	-0.50			-0.26	
			(1.23)			(0.41)	
	$MKSHARE^S$	-	-1.60			-2.65	
			(2.45)***			(2.48)***	
Firm performance	ROA^F	-	-1.28	-1.48	-1.24	-0.76	-0.89
			(4.36)***	(5.39)***	(4.28)***	(1.76)*	(1.89)*
	$SALEG^F$	-	-0.004	0.07	0.01	-0.25	-0.20
			(0.03)	(0.54)	(0.05)	(1.10)	(0.97)
Distress/ financing	$LEVRG^F$	+	0.69	0.64	0.67	1.10	0.92
			(4.74)***	(4.45)***	(4.64)***	(4.96)***	(4.25)***
	$\Delta WCRATIO^F$	-	0.21	0.27	0.22	0.39	0.34
			(1.16)	(1.53)	(1.23)	(1.36)	(1.21)
	$EXFINANCE^F$	+	-0.30	-0.25	-0.26	-0.12	-0.09
			(2.69)***	(2.28)**	(2.37)***	(1.56)	(1.41)
Segment size	$SIZE^S$	-	-0.78			-1.99	
			(3.94)***			(5.89)***	
Firm size	$SIZE^F$	+/	-0.01	-0.02	-0.02	-0.05	-0.02
		-	(0.69)	(0.96)	(1.28)	(1.11)	(0.93)
Log-Likelihood			-3140.5	-3429.3	-3168.0	-1333.0	-1494.0
% of Concordant pairs			74.2%	56.0%	73%	77.6%	54.1%
Likelihood ratio index			0.094	0.010	0.085	0.120	0.011
Likelihood ratio statistic for the model			648.2***	70.55***	594.0***	352.90***	30.86***
Likelihood ratio test for $\beta^S=0$			577.6***			322.0***	
No. of segments divested			806	806	806	330	330
No. of continuing segments			21418	21418	21418	11602	11602

Table 3.7 Univariate Tests of Independent Variables Two Years Prior to Divestitures

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflators. *P*-values are in parentheses.

Hypotheses	**Variables**	**Prd**	**Divestiture subsample (N=659)**		**Control subsample (N=17070)**		***t*-test statistic (Wilcoxon Z) for differences in**	
			Mean	Median	Mean	Median	Mean	Median
Industry shock	$SHOCK^F$	+	0.277	0	0.266	0	0.66 (0.51)	0.66 (0.51)
	$SHOCK^S$	+	0.330	0	0.276	0	**2.68 (0.007)**	**2.80 (0.005)**
Focus	$FOCUS3^S$	+	0.925	1	0.606	1	**29.32 (0.001)**	**16.55 (0.001)**
	$FOCUS2^S$	+	0.847	1	0.464	0	**26.30 (0.001)**	**19.30 (0.001)**
	$FOCUS1^S$	+	0.634	1	0.306	0	**17.18 (0.001)**	**17.74 (0.001)**
Segment earnings prospects	$SROA^S$	-	-0.063	-0.019	0.036	0.017	**-3.10 (0.002)**	**-9.28 (0.001)**
	$CAPRATIO^S$	-	0.002	-0.002	0.002	0.001	-0.02 (0.25)	-3.07 (0.002)
	$MKSHARE^S$	-	0.029	0.030	0.041	0.041	**-4.86 (0.001)**	**-6.02 (0.001)**
Firm performance	ROA^F	-	0.040	0.055	0.058	0.070	**-3.92 (0.001)**	**-5.69 (0.001)**
	$SALEG^F$	-	0.069	0.040	0.058	0.050	0.48 (0.62)	-0.27 (0.79)
Distress/ financing	$LEVRG^F$	+	0.057	0.039	0.033	0.017	**2.46 (0.01)**	**3.07 (0.00)**
	$\Delta WCRATIO^F$	-	-0.026	0.000	-0.033	0.000	0.85 (0.40)	0.21 (0.83)
	$EXFINANCE^F$	+	0.156	0	0.170	0	-0.98 (0.32)	-0.95 (0.34)
Segment size	$SIZE^S$	-	0.217	0.141	0.360	0.284	**-15.94 (0.001)**	**-13.71 (0.001)**
Firm size	$SIZE^F$	+/-	5.816	5.754	6.095	6.215	**-2.81 (0.005)**	**-3.15 (0.002)**

Table 3.8 Results of Logistic Regressions Two Years Prior to Divestitures

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^F$ is 1/CUR of the firm's industry using the sample of Manufacturing Mining and Utilities. $SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. $SHOCK^S$ is 1/CUR of the segment's industry using the sample of Manufacturing Mining and Utilities. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflators. *t*-values are in parentheses. *** indicates significance at 0.01 , ** indicates significance at 0.05 and * indicates significance at 0.1 levels respectively for two-tailed test.

Hypotheses	Variables	Pd	Full sample 1989-1993			Manufacturing, Mining and Utilities 1989-1993	
			Model 1	Model 2	Model 3	Model 1	Model 2
	INTERCEPT	-	-4.41	-3.08	-4.79	-5.95	-4.64
			(20.08)***	(29.3)***	(27.6)***	(4.51)***	(4.18)***
Industry shock	$SHOCK^F$	+	0.05	0.10	0.06	0.78	1.04
			(0.52)	(1.12)	(0.70)	(0.81)	(1.20)
	$SHOCK^S$	+	0.18		0.19	0.81	
			(2.12)**		(2.26)**	(1.76)*	
Focus	$FOCUS3^S$	+	0.94		1.12	0.98	
			(4.56)***		(5.58)***	(3.69)***	
	$FOCUS2^S$	+	0.86		0.88	0.69	
			(5.17)***		(5.33)***	(3.30)***	
	$FOCUS1^S$	+	0.33		0.37	0.46	
			(3.26)***		(3.61)***	(2.90)***	
Segment earnings prospects	$SROA^S$	-	-0.14			-0.32	
			(2.74)***			(3.46)***	
	$CAPRATIO^S$	-	-0.12			-0.43	
			(0.26)			(0.54)	
	$MKSHARE^S$	-	-1.62			-2.44	
			(2.28)**			(2.05)**	
Firm performance	ROA^F	-	-0.69	-0.99	-0.66	-0.65	-0.95
			(1.93)**	(2.94)***	(1.89)*	(2.17)**	(2.38)**
	$SALEG^F$	-	0.21	0.27	0.20	0.50	0.54
			(1.53)	(1.98)**	(1.46)	(1.07)	(1.39)
Distress /financing	$LEVRG^F$	+	0.44	0.40	0.42	0.95	0.76
			(2.64)***	(2.43)***	(2.55)***	(3.61)***	(3.00)***
	$\Delta WCRATIO^F$	-	0.13	-0.18	0.14	0.34	0.32
			(0.59)	(0.85)	(0.64)	(0.95)	(0.88)
	$EXFINANCE^F$	+	-0.25	-0.21	-0.22	-0.33	-0.38
			(2.09)**	(1.68)*	(1.83)*	(1.12)	(1.31)
Segment size	$SIZE^S$	-	-0.67			-1.42	
			(3.11)***			(3.93)***	
Firm size	$SIZE^F$	+/	-0.02	-0.03	-0.03	-0.06	-0.04
		-	(0.98)	(1.19)	(1.51)	(1.25)	(1.13)
Log-Likelihood			-2562.6	-2800.7	-2577.0	-1050.0	-1170.5
% of Concordant pairs			73.3%	52.5%	72.2%	77.4%	55.8%
Likelihood ratio index			0.090	0.010	0.084	0.113	0.02
Likelihood ratio statistic for the model			544.6***	30.9***	478.6***	268.8***	27.54***
Likelihood ratio test for $\beta^S=0$			476.2***			241***	
No. of segments divested			659	659	659	257	257
No. of continuing segments			17070	17070	17070	9354	9354

Table 3.9 Univariate Tests of Independent Variables between Sold-off Segments and Spun-off Segments

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflators. *P*-values are in parentheses.

Hypotheses	**Variables**	**Sell-offs Subsample (N=749)**		**Spin-offs subsample (N=57)**		***t*-test statistic (Wilcoxon Z) for differences in**	
		Mean	Median	Mean	Median	Mean	Median
Industry shock	$SHOCK^F$	0.25	0	0.30	0	-0.66 (0.51)	-0.69 (0.49)
	$SHOCK^S$	0.32	0	0.37	0	-0.64 (0.52)	-0.66 (0.51)
Focus	$FOCUS3^S$	0.93	1	0.91	1	0.50 (0.61)	0.56 (0.57)
	$FOCUS2^S$	0.84	1	0.81	1	0.60 (0.55)	0.65 (0.52)
	$FOCUS1^S$	0.62	1	0.61	1	0.16 (0.87)	0.16 (0.87)
Segment earnings prospects	$SROA^S$	-0.15	-0.03	-0.03	0.00	**-2.03 (0.04)**	**-2.21 (0.02)**
	$CAPRATIO^S$	-0.03	-0.004	0.02	0.00	-1.53 (0.12)	**-1.89 (0.05)**
	$MKSHARE^S$	0.03	0.00	0.07	0.03	**-3.51 (0.00)**	**-5.79 (0.00)**
Firm performance	ROA^F	0.02	-0.03	0.08	0.00	**-6.41** (0.00)	**-2.21** (0.02)
	$SALEG^F$	0.07	0.040	0.08	0.050	-0.50 (0.61)	-0.27 (0.79)
Distress/ financing	$LEVRG^F$	0.08	0.05	0.09	0.09	-0.62 (0.53)	-1.40 (0.16)
	$\Delta WCRATIO^F$	-0.03	0.000	-0.01	0.000	-1.08 (0.31)	-0.91 (0.36)
	$EXFINANCE^F$	0.16	0	0.19	0	-0.62 (0.53)	-0.62 (0.54)
Segment size	$SIZE^S$	0.21	0.13	0.23	0.18	-0.82 (0.41)	-1.58 (0.11)
Firm size	$SIZE^F$	5.64	5.56	7.56	8.05	**-7.27** (0.00)	**-5.99** (0.00)

Table 3.10 Results of Separate Logistic Regressions for Sell-offs and Spin-offs One Year Prior to Divestitures

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflators. *t*-values are in parentheses. *** indicates significance at 0.01 , ** indicates significance at 0.05 and * indicates significance at 0.1 levels respectively for two-tailed test.

Hypothesis	Variables	Prd	Sell-offs 1989-1994	Spin-offs 1989-1994
	INTERCEPT	-	-4.39	-9.59
			(21.14)***	(11.27)***
Industry shock	$SHOCK^F$	+	-0.05	0.07
			(0.78)	(0.91)
	$SHOCK^S$	+	0.18	0.33
			(2.14)**	(1.17)
Focus	$FOCUS3^S$	+	1.18	1.06
			(6.15)***	(1.67)*
	$FOCUS2^S$	+	0.66	0.64
			(4.47)***	(1.24)
	$FOCUS1^S$	+	0.26	0.53
			(2.74)***	(1.51)
Segment earnings prospects	$SROA^S$	-	-0.17	-0.14
			(4.63)***	(0.70)
	$CAPRATIO^S$	-	-0.67	1.87
			(1.58)	(1.44)
	$MKSHARE^S$	-	-2.07	0.45
			(2.89)***	(0.28)
Firm performance	ROA^F	-	-1.31	2.04
			(4.43)***	(1.05)
	$SALEG^F$	-	-0.02	0.22
			(0.13)	(0.38)
Distress/ financing	$LEVRG^F$	+	0.67	1.11
			(4.47)***	(1.79)*
	$\Delta WCRATIO^F$	-	0.20	0.55
			(1.06)	(0.56)
	$EXFINANCE^F$	+	-0.32	-0.33
			(2.56)**	(0.84)
Segment size	$SIZE^S$	-	-0.85	0.34
			(4.11)***	(0.46)
Firm size	$SIZE^F$	+/-	-0.03	0.25
			(1.19)	(3.47)***
Log-Likelihood			-2958.0	-363.5
% of Concordant pairs			74.8%	68.8%
Likelihood ratio statistic for the model			630.90***	37.86***
Likelihood ratio test for $\beta^S=0$			553.0***	30***
No. of segments divested			749	57
No. of continuing segments			21418	21418

Table 3.11 Results from Multinomial Logistic Regressions One Year Prior to Divestitures

$SHOCK^F$ is 1 if firm's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise in full sample. $SHOCK^F$ is I/CUR of the firm's industry using the sample of Manufacturing Mining and Utilities. $SHOCK^S$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise is full sample. SHOCK' is I/CUR of the segment's industry using the sample of Manufacturing Mining and Utilities. $FOCUS3^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1^S$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SROA^S$ is segment's operating return – firm's operating return. $CAPRATIO^S$ is segment's capital expenditure to asset ratio – firm's capital expenditure to asset ratio. $MKSHARE^S$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. ROA^F is firm's operating income divided by total assets. $SALEG^F$ is the change of sales from prior year divided by sales in prior year adjusted by the GNP deflators. $\Delta WCRATIO^F$ is change of working capital to asset ratio from the prior year. $LEVRG^F$ is industry adjusted ratio of total liability to total assets. $EXFINANCE^F$ is 1 if (capital expenditures-cash from operation)/current assets>0.5 and 0 otherwise. $SIZE^S$ is segment's sales divided by firm's sales. $SIZE^F$ is natural logarithm of book value of firm's total assets adjusted by GNP deflators. *t*-values are in parentheses. *** indicates significance at 0.01, ** indicates significance at 0.05 and * indicates significance at 0.1 levels respectively for two-tailed test.

Hypotheses	Variables	Pd	Full sample 1989-1994		Manufacturing, Mining and Utilities 1989-1994	
			Sell-offs	Spin-offs	Sell-offs	Spin-offs
	INTERCEPT	-	-4.34	-9.56	-4.09	-20.7
			(20.8)***	(5.98)***	(3.29)***	(3.70)***
Industry shock	$SHOCK^F$	+	-0.05	-0.12	-0.84	1.07
			(0.59)	(0.37)	(0.79)	(1.06)
	$SHOCK^S$	+	0.19	0.14	1.16	1.25
			(2.29)**	(0.46)	(2.12)**	(0.37)
Focus	$FOCUS3^S$	+	1.16	0.11	1.01	0.36
			(6.04)***	(0.17)	(4.09)***	(0.44)
	$FOCUS2^S$	+	0.64	0.01	0.55	1.02
			(4.30)***	(0.00)	(2.89)***	(1.56)
	$FOCUS1^S$	+	0.28	0.25	0.36	0.89
			(2.93)***	(0.69)	(2.44)***	(1.03)
Segment earnings prospects	$SROA^S$	-	-0.17	-0.03	-0.25	-0.12
			(4.64)***	(0.17)	(3.91)***	(0.5)
	$CAPRATIO^S$	-	-0.63	0.48	-0.88	0.86
			(1.49)	(0.84)	(1.27)	(0.66)
	$MKSHARE^S$	-	-1.99	-0.45	-3.54	-0.51
			(2.74)***	(1.39)	(2.05)**	(1.49)
Firm performance	ROA^F	-	-1.28	2.37	-0.82	-0.81
			(4.32)***	(1.74)*	(1.81)*	(0.28)
	$SALEG^F$	-	-0.04	-0.28	0.38	0.75
			(0.39)	(0.45)	(1.36)	(0.75)
Distress /financing	$LEVRG^F$	+	0.65	-0.43	1.15	1.06
			(4.32)***	(0.68)	(5.00)***	(1.09)
	$\Delta WCRATIO^F$	-	0.20	0.36	0.38	1.04
			(0.89)	(0.33)	(1.31)	(0.74)
	$EXFINANCE^F$	+	-0.30	0.03	0.20	-0.48
			(1.23)	(0.01)	(0.88)	(1.28)
Segment size	$SIZE^S$	-	-0.89	1.20	-2.12	1.33
			(4.23)***	(1.60)*	(1.87)*	(1.05)
Firm size	$SIZE^F$	+/-	-0.03	0.28	-0.07	0.31
			(1.48)	(3.81)***	(1.57)	(2.84)***
No. of segments divested			749	57	299	27
No. of continuing segments			21418		11607	

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CHAPTER 4

THE EFFECTS OF CEO TURNOVER AND MANAGEMENT INCENTIVES ON DIVESTITURES

1. INTRODUCTION

There is considerable controversy on the role of top management and their incentives in divestiture decisions. Jensen (1993) argues that corporate governance has failed to deal with divestiture decisions in a timely manner; he further urges researchers to study the effects of internal control mechanism on divestitures. Prior studies document evidence that CEO change increases the likelihood of divestiture (Ravenscraft and Scherer 1987; Weisbach 1995). However, the association between CEO turnover and divestiture decisions is consistent with several explanations in finance and accounting literatures. These explanations include different strategies and abilities between replacement CEOs and their predecessors, failure to divest poorly performing segments on the part of departing CEOs as well as earnings management incentives of incoming CEOs. A proper interpretation of the association between CEO turnover and divestitures requires a simultaneous examination of investment decisions and discretion in the period preceding divestitures and management incentives at the time of divestitures. The purpose of this Chapter is to further investigate the effects of CEO turnover and management incentives on divestitures. In addition, this chapter ensures that the findings in Chapter 3 are not attributable to omitted variables relating to CEO turnover.

Murphy and Zimmerman (1993) and Pouriau (1993) examine earnings management surrounding CEO turnover. These two studies report evidence that departing CEOs do not cover up poor performance by manipulating accounting accruals but report

mixed evidence on earnings manipulation by incoming CEOs. The interpretation of the results from earnings management tests surrounding CEO turnover is limited because these studies do not control for concurrent changes of firm performance surrounding CEO turnover. Bartov[1](1993) examines the timing of accruals from asset sales and reports evidence that the timing of asset sales is consistent with management incentives to smooth income and to avoid the violation of covenants in firms' debt contracts. Similarly, Bartov (1993) does not control for the economic variables that also predict the timing of asset disposition.

We examine the effects of CEO turnover and management incentives on divestiture decisions after controlling for other economic variables that predict the likelihood of divestitures. Specifically, we examine whether divested assets that were associated with CEO turnover had poorer performance than divested assets that were not associated with CEO turnover. We also examine whether CEO turnover still increases the likelihood of divestitures after controlling for the past performance of divested segments. In this way, positive evidence would suggest that replacement CEOs undertake divestitures because of different investment strategies from their predecessors or because of their incentives for earnings management.

We further examine whether the timing of divestitures is consistent with managers' incentive to take an earnings bath and whether the existence of an earnings-based long-term incentive plan increases the timeliness of divestitures. Finally, we examine whether the ownership stakes by the CEO, insiders (directors and executives as a

[1] Bartov examines asset sales that give rise to accruals of gains and losses that are reported as part of the income before extraordinary and discontinued operations. Thus asset sales in his sample are likely to be smaller and less visible than sell-offs of segments of businesses, which are the focus of this study.

group) and outside directors influence the likelihood of divestitures that increase corporate focus.

We investigate the effects of CEO turnover and incentives on divestitures using a sub-sample of 100 firm-year observations that involve 117 sell-offs of segments for the period from 1990 and 1995 and a control sample of industry- and size-matched nondivesting observations. We select a sub-sample of divestitures because it is costly to collect data on CEO turnover and firms' executive compensation plans.

The empirical evidence indicates that divesting firms are more diversified and have poorer earning performance than the control counterparts in the year preceding divestitures. But the difference of the number of business segments between the two groups disappears in the year of divestiture. This is consistent with divestitures being partly motivated to reverse diversification in prior periods.

Results from logistic regressions indicate that divested segments that were associated with CEO turnover had performed significantly poorer than divested segments that were not associated with CEO turnover. This suggests that the failure to divest of poorly performing segments was one reason for the CEOs' departure. Furthermore, controlling for the past performance of divested segments that were associated with CEO turnover, we find that CEO turnover increases the likelihood of divestitures in the logistic regression. This suggests that some divestitures associated with CEO turnover were made because of different strategies or skills between replacement CEOs and their predecessors or because of new CEOs' incentives for earnings manipulation. However, under the bonus-related earning management story, managers should time divestitures in a year for which they expect to finish in the low bound of their annual bonus plans in order to

increase future bonus payments (Healy 1985). we find no support for the hypothesis that managers time divestitures in the year when they finish in the low bound of their annual bonus plans. We interpret this as inconsistent with the 'big bath' hypothesis. Also we find no support for the hypothesis that the existence of earnings-based long-term incentive plans increases the timeliness of divestiture decisions.

Finally, we find that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus. In contrast, we find that higher equity ownership either by the CEO or by insiders (directors and executives as a group) has no significant effect on the likelihood of divestitures that increase corporate focus.

This paper contributes to the existing literature in several ways. First, by controlling for the past performance of divested assets, this study provides direct evidence on the extent to which divestitures are driven by the failure to divest poorly performing segment on the part of departing CEOs and earnings management incentives of replacement CEOs. Thus our evidence sheds light on the interpretation of the association between CEO turnover and divestiture decision which was not possible in Weisbach (1995) and in Ravenscraft and Scherer (1987). Our findings suggest that what appears to be an earnings bath at the time of divestitures by new CEOs is largely the result of poor performance and discretion in prior periods.

Second, our finding on the poorer performance of divested segments that were associated with CEO turnover suggests that CEO changes were endogenous and were related to the poorer performance of the divested assets. An implication of this finding is that segment information serves an important stewardship function in executive contracts, which has received little attention in the existing literature. While prior studies report

evidence that poor stock-price and earnings performance increase the likelihood of CEO turnovers, researchers question whether the predictive power of the stock and earnings performance for CEO turnover is economically significant (Warner et al. 1988; Weisbach 1988). The finding in this study suggests that future research might examine the incremental usefulness of segment information in predicting CEO turnover.

Thirdly, our finding that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus provides additional evidence on the monitoring role of outside directors in corporate investment decisions. It complements prior evidence on the role of outside directors and their incentives in monitoring corporate managers (Weisbach 1988; Shivdasani 1993).

The remainder of this paper is organized as follows: Section 2 discusses the hypothesized effects of CEO turnover and management incentives on divestiture decisions. Section 3 discusses the sample design and firm characteristics of our sample. Section 4 discusses the research design in investigating the effects of CEO turnover and management incentives on divestitures. Section 5 reports the empirical results. Section 6 summarizes and concludes this chapter.

2. HYPOTHSIZED EFFECTS OF CEO TURNOVER AND MANAGEMENT INCENTIVES ON DIVESTITURES

2.1 The Effects of CEO Turnover on Divestitures

There are three potential causes that could lead divestitures to cluster at the time of CEO turnover. The first cause for the clustering of divestitures at the time of CEO turnover is the difference of strategies and skills in managing assets between replacement

CEOs and their predecessors. With this cause, CEO changes increase the likelihood of divesting assets because of different investment strategies of new CEOs from their predecessors. However, with this cause, divestiture candidates do not have to be poorly performing units in the organization prior to their divestiture. This is because the criterion for a divestiture candidate is whether it fits the new CEO's investment strategy or management skills.

The second cause that leads divestitures to cluster at CEO turnover is the failure to divest segments on the part of departing managers in prior periods. Proponents of this cause use agency theory to argue that managers are often reluctant to divest assets for personal reasons even though divestitures serve the interests of shareholders. The result is that divestitures cluster at the time of incumbent managers being replaced because of dismissal by the board or through normal retirement procedure. This cause predicts that divested segments that are associated with CEO turnover are likely to have significantly poorer performance than divested segments that are not associated with CEO turnover. This is because failure to improve or divest of poorly performing segments is one reason for the departure of the preceding CEO. The presumption is that poorly performing segments are more likely to have a liquidation value above their going concern value than more profitable segments are. In short, if divestitures by replacement CEOs serve the function of correcting poor decisions, divested segments that are associated with CEO turnover should have poorer performance than divested segments that are not associated with CEO turnover.

As per Chapter 3, we continue to expect a negative main effect between segment performance and the likelihood of divestiture. Additionally, the above discussion of the effects of CEO turnover on divestitures suggests the following hypotheses:

H1a: (Strategy hypothesis) CEO turnover increases the likelihood of divestitures regardless of segment performance.

H1b: (Management entrenchment hypothesis) There is an interaction between segment performance and CEO turnover so that the probability of divestiture is significantly higher when segment performance is poor and there is a new CEO.

2.2 The Effects of Executive Compensation Plans on Divestitures

The third cause for the positive relationship between management change and divestitures is based on the opportunistic behavior of incoming managers. Existing literature in accounting suggests that one incentive to manipulate earnings for managers' personal gain comes from firms' executive compensation plans. Healy (1985) reports evidence that firms' accrual choices are consistent with managers' incentives to maximize their bonus payment in the annual bonus scheme even though recent tests generate mixed evidence on the same hypotheses (Gaver et al. 1995; Holthausen et al. 1995). The controversy surrounding divestitures by new CEOs is whether these managers use divestitures to take a big bath so that future bonus payments can be made larger and easier to earn. However, according to Healy (1985), the incentive to take a big bath is not limited to replacement CEOs. More generally, the big bath hypothesis predicts that

managers time divestitures in the year when they expect to finish in the low bound of their annual bonus plans.

Besides annual bonus plans that can potentially affect the timing of divestitures, earnings-based long-term incentive plans (LTIP) can also influence the timing of divestitures. Unlike annual bonus plan, LTIP typically awards cash or stocks to top executives based on the growth of earnings per share or return on equity (or invested capital) over a period of 3 to 5 years. The purpose of LTIP is to provide firms' key executives incentives to make decisions in the long-run interest of shareholders. Accordingly, the existence of an LTIP should encourage managers to make timely divestiture decisions and reduce the tendency to subside poorly performing segments by using profits from other segments of the firm. This is because part of the managers' compensation is linked to the firms' long-term earnings performance. The gain from delaying divestiture in one year has its cost in future years. On the other hand, the existence of an LTIP may delay divestiture decisions by CEOs with short employment horizon or closer to the finishing years of their performance cycles. By leaving divestiture decisions to the incoming CEOs, departing CEOs hope their payouts from LTIPs not to be adversely affected by the negative impact of divestitures on earnings. Thus it is an empirical question as to whether the existence of an LTIP increases the timeliness of divestitures. Tehranian et al (1987) report evidence that sell-offs for firms with LTIPs are associated with larger announcement-period abnormal returns. A possible reason for the larger abnormal returns is that a LTIP provides management incentives to make timely divestitures.

Our discussion of the effects of executive compensation plans leads to the following hypotheses:

H2a: The likelihood of divestiture is higher in the year when managers are expected to finish in the low bound of their annual bonus plans than in other years.

H2b: The existence of an LTIP increases the timeliness of divestitures.

2.3 The Effects of Equity Ownership by the CEO, Insiders, and Outside Directors on Divestitures

Agency based theory suggests that management incentives as well as the monitoring of the board of directors also have implications for the type of divestitures. Recent studies in the finance literature report evidence that divestitures that increase corporate focus are associated with larger announcement-period abnormal returns than those that do not (John and Ofek 1995; Daley et al. 1995). Furthermore, Comment and Jarrell (1995) find that increases in corporate focus after divestitures are associated with long-term improvement in stock performance and cash flows. If part of the wealth effect of focus-increasing divestitures comes from a reduction of the agency cost of management, the likelihood of a divestiture that increases corporate focus should be related to the degree of interest alignment between management, board of directors and shareholders.

One gauge of interest alignment between management and shareholders is the equity ownership by the CEO. Larger equity ownership by the CEO gives the CEO a

stronger incentive to maximize shareholders' wealth[2]. Thus higher CEO ownership, arguably, should also increase the likelihood of divestitures that increase focus. However, higher equity ownership by the CEO may also work in the opposite direction. This is because larger ownership by a CEO causes the risk of the CEO's income to be more closely related to the firm's risk. A risk-averse CEO may diversify his employment risk by engaging the firm in diversification or conglomerate mergers (Amihud and Lev 1981). Therefore, it is an empirical question as to whether higher equity ownership by CEO increases the likelihood of divestitures that increase corporate focus.

Similarly, higher equity ownership by insiders as a group, in principle, should align the incentives of corporate insiders and shareholders better than lower equity ownership by insiders. In a similar vein, we hypothesize that higher equity ownership by insiders increases the likelihood of focus-increasing divestitures.

The board of directors is viewed as an important internal corporate governance mechanism. The board's authority includes supervising managers, determining the level and structure of executive compensation and replacing managers. Existing studies find that poor firm performance increases the likelihood of management change and attribute this to the successful monitoring of the board of directors (Coughlan and Schmidt 1985; Warner et al. 1988; Weisbach 1988). An effective board can influence divestitures by replacing managers that resist divestitures when divestitures serve the interests of shareholders. In addition, major divestitures require the approval from the board of

[2] The relationship between management incentive and equity ownership by the CEO may not be monotonic. The empirical evidence by Morck et al (1988) shows that this relationship is not monotonic. Therefore the assumption of a monotonic relationship in the empirical tests reported in this paper should be taken with caution.

directors. An effective board, in principle, should screen and approve those divestiture proposals that enhance shareholders' wealth.

Prior studies show that boards are not equally effective in monitoring management. Several studies document evidence that boards composed largely of outsiders are more effective than boards with few seats by outsiders (Weisbach 1988; Rosenstain and Wyatt 1990). Shivdasani (1993) reports that outside directors have lower ownership stakes in hostile takeover targets relative to a control sample. He interprets the evidence as the effectiveness of the board increasing in the ownership by outside directors.

Given the existing literature on the relationship between board effectiveness and equity ownership by outside directors, we hypothesize that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus.

Our above discussion on the effects of equity ownership by the CEO, insiders, and outside directors on divestitures leads us to the following hypotheses:

H3a: Higher equity ownership by the CEO increases the likelihood of divestitures that increase corporate focus.

H3b: Higher equity ownership by insiders increases the likelihood of divestitures that increase corporate focus.

H3c: Higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus.

3. SAMPLE DESIGN

To examine the effects of CEO turnover and management incentives on divestiture decisions, we employ a matched-pair sample design. We select 100 firm-year observations of divestitures that involve 117 sell-offs of segments of businesses between 1990 and 1995 and that firm's stock is traded on New York Stock Exchange. Furthermore, we focus on firms traded on New York Stock Exchange for better access and better quality of proxy statements. These observations are randomly drawn from the pool of all divestitures of segments for the period from 1990 to 1995 that were detected from the Industry Segment File on COMPUSTAT by searching through the change of segments reported from year to year. We select only sell-offs of business segments by reading firms' annual reports in the year of divestiture. For each of the 100 firm-year observations, we select a control multi-segment firm (at least two segments) in the same year that satisfies the following conditions: (1) the firm did not divest a business segment in that year; (2) the firm has the same 3-digit SIC code; (3) it minimizes the absolute difference of book value of assets in the year preceding divestiture decision.

Panel A of table 4.1 reports the distribution of 100 firm-year or 117 segment-year divestitures over 2-digit SIC industries. The 117 segment-year divestitures exceed the number of firm-year observations because 17 firms had divestitures of 2 segments within the same fiscal year. Panel A of the table shows that divesting firms are distributed over a wide range of 2-digit SIC industries. Panel B reports the distribution of firm-year divestitures and segment-year divestitures in each year over the six-year period. The number of firms with divestitures varies from 14 in 1990 to 21 in 1993. Again it shows no concentration of divestitures in any particular year over the sample period.

In table 4.2, we compare the means (medians) of selected firm characteristics between divesting firms and the control group of nondivesting firms for the year preceding divestitures and in the year of divestitures[3]. As shown in the table, the mean book value of assets ($5,163 million) for the divesting group is somewhat larger than for the nondivesting group ($3,909 million) in the year preceding divestitures; but the difference between the two is not significant (t-statistic=0.44). Similarly, the mean value of sales is not significantly different between the two groups.

The mean and median values of firm's net income to assets ratio is significantly less for the divesting firms than the mean and median for the control group. This suggests that divesting firms were under-performing relative to their industry counterparts in the year preceding divestitures. The mean (median) number of business segments for the divesting firms is 3.9 (4), which is significantly larger than the 2.86 (3) of the nondivesting counterparts[4]. Therefore, divesting firms are more diversified than their nondivesting counterparts in the year preceding divestitures. In contrast to the significant difference of net income to total assets ratio between the two groups in the year preceding divestitures, the mean abnormal return (0.47%) for the divesting firms is not significantly different from the mean abnormal return (1.7%) for their nondivesting counterparts. Further, there is no significant difference of leverage ratio between the two groups.

The lower panel of the table compares firm characteristics between divesting and nondivesting groups in the year of divestiture decision. Again, there is no significant difference of firm size as measured either by assets or sales between the two groups of

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[3] No divesting firm reappears in the control sample.

[4] In contrast, we did not find a significant difference of the number of segments between the divesting firms and non-divesting firms when we use the overall population of multi-segment firms in Chapter 3.

firms in the year of divestiture. The mean ratio of net income to total assets is negative (-1.2%) and significantly lower for the divesting firms than that of the control counterparts. Interestingly, in the year of divestitures, the mean number of business segments for the divesting firms is no longer different from that of the control group. This evidence is consistent with divestitures being partly driven by the desire to retain corporate focus (John and Ofek 1995; Daley et al. 1997). Also the mean (median) abnormal return in the year of divestiture decision is -9% (-3.4%) and is significantly less than mean (median) abnormal return of the nondivesting counterparts (p-value <0.01). Finally, the leverage ratios between the group of divesting firms and control group are quite similar.

To summarize, our comparison of firm characteristics between divesting firms and the control group of firms reveals that divesting firms have poorer performance than their control counterparts in the year preceding and in the year of divestiture. This is not surprising given that we know firms with CEO turnover, on average, underperform. Also divesting firms were more diversified than their control counterparts. The next section outlines our research design for testing the effects of CEO turnover and management incentives on divestitures.

4. RESEARCH DESIGN

4.1 Definition of Variables that Represent CEO Turnover and Management Incentives

To test the effect of CEO turnover on divestitures, we define variable CEOTNOV as a dummy variable that takes the value of 1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestitures. Like Ravenscraft and Scherer

(1987), we choose a 24-month window for CEO turnover because divestitures are frequently made when the replacement CEO takes full charge of the firm's operation after the transition year.

We define variable $BATH_{it}$ to take the value of 1 if the CEO's bonus payment is zero in the year of divestiture. We choose to use *ex post* zero bonus payment as the measure of the bath incentive because annual bonus plans disclosed in proxy statements for most firms in our sample are not explicit enough to assess whether a CEO finishes at the low bound of the bonus plans. Additionally, firms often do not state whether annual bonus formula is based on earnings before or after income from discontinued operations. The use of *ex post* zero bonus payment allows us to know that it was in the CEO's interest to take a bath[5].

LTIP is defined as a dummy variable that takes the value of 1 if a firm has an earnings-based LTIP and 0 otherwise. LTIP includes these that award executive cash and/or stocks based on growth on earning per share, average or growth of return on equity (or invested capital) over a period of 3-5 years[6]. We define variable CEOWN as a dummy variable that takes the value of 1 if the CEO's equity ownership[7] is greater than the median equity ownership in our sample and 0 otherwise. Similarly, variable INSOWN is 1 if equity ownership by insiders of the firm exceeds the median equity ownership by insiders in our sample and 0 otherwise[8]; variable OTDOWN is 1 if equity ownership by

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[5] This is similar to the one used by Holthausen et al. (1995) in studying manipulation of accruals at the low bound of annual bonus plans using confidential compensation data.

[6] A stock price-based LTIP is not very common. In fact, only one firm in our sample has LTIP that is based exclusively on stock performance.

[7] Equity ownership includes direct ownership and contingent shares in the form of stock options that can be exercised within 60 days.

[8] The number of people included as insiders varies from firm to firm. We use the equity ownership by directors and executives that is reported by managers in the proxy statement.

outside directors of the firm exceeds the median equity ownership by outside directors in the sample and 0 otherwise[9].

Data on the characteristics of the board of directors, CEO and compensation plans are collected directly from proxy statements in the year of divestiture.

4.2. Controlling for the Economic Variables that Predict Divestitures

As mentioned in the introduction, we investigate the effects of CEO turnover and management incentives on divestitures controlling for the economic variables that predict divestiture decisions. Existing theories in economics and finance, and our empirical evidence reported in Chapter 3 suggest that the likelihood of a segment's divestiture is related to economic forces originating from the industry, firm and segment level. Specifically, we control for the following economic variables that we found in Chapter 3 to have significant influence on the likelihood of a segment's divestiture: segment's performance relative to the firm's performance ($SROA_{it-1}$), firm performance (ROA_{it-1}), leverage ratio ($LEVRG_{it-1}$), the un-relatedness of a segment line of business to the firm's primary line of business ($FOCUS3_{it-1}$, $FOCUS2_{it-1}$, $FOCUS1_{it-1}$), poor industry performance in the segment line of business ($SHOCK_{it-1}$), segment's market share ($MKSHARE_{it-1}$) in its 3-digit SIC industry, and segment size ($SIZE_{it-1}$). These variables are measured as described in Chapter 3 and we again employ a logistic regression method to investigate the effect of CEO turnover and management incentives on divestitures.

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[9] Outside directors are directors who are not also employee of the company. We do not adjust for directors who may be involved with consulting, legal service to the firm because of the judgmental nature of such adjustment.

4.3 The Econometric Specification

Our discussion on the effects of CEO turnover on divestitures in section 2.1 suggests that, if quick divestitures by replacement CEOs reflects a failure to divest on the part of their predecessors, our hypothesis H1b predicts a negative coefficient for $CEOTNOV*SROA_{it-1}$. If divestitures associated with CEO changes are the result of different strategies between replacement CEOs and their predecessors, our hypothesis H1a predicts a positive coefficient for CEO turnover (CEOTNOV) after controlling for the past performance of the divested segment. These hypotheses are not mutually exclusive and new CEOs may divest for both reasons.

If managers time the divestitures to take an earnings bath because of the annual bonus scheme, hypothesis H2a predicts variable $BATH_{it}$ to have a positive coefficient in the logistic regression. Furthermore, if the existence of an LTIP increases the timeliness of divestiture, hypothesis H2b predicts a positive coefficient for $LTIP*SROA_{it-1}$ in the logistic regression.

If higher equity ownership by the CEO, insiders, and outside directors increase the likelihood of divestitures that increase corporate focus, our hypotheses H3a, H3b and H3c predict variables $CEOWN*FOCUS3_{it-1}$, $INSOWN*FOCUS3_{it-1}$, $OTDOWN*FOCUS3_{it-1}$ to all have positive coefficients in the logistic regression.

We summarize the definition of dependent variable, independent variables, their predicted signs and measurements in Exhibit 4.1.

Exhibit 4.1 A Summary of Hypotheses, Variables, Predicted Signs and Measurements

Variables	Prd		Measurement of Variables
Dependent variable		=	1 if segment i is divested in year t and 0 otherwise.
$SROA_{it-1}$	-	=	Segment's operating return – firm's operating return.
ROA_{it-1}	-	=	Firm's operating income divided by total assets.
$LEVRG_{it-1}$	+	=	Total liability divided by total assets.
$FOCUS3_{it-1}$	+	=	1 if segment's SIC code is not equal to firm's primary SIC code at 3 digit level and 0 otherwise.
$FOCUS2_{it-1}$	+	=	1 if segment's SIC code is not equal to firm's primary SIC code at 2 digit level and 0 otherwise
$FOCUS1_{it-1}$	+	=	1 if segment's SIC code is not equal to firm's primary SIC code at 1 digit level and 0 otherwise.
$SHOCK_{it-1}$	+	=	1 if segment's 3-digit industry operating return falls into the lowest 25% for all industries and 0 otherwise.
$MKSHARE_{it-1}$	-	=	Segment's sales divided by aggregate sales of the segment's 3-digit SIC industry.
$SIZE_{it-1}$	-	=	Segment's sales divided by firm's sales.
CEOTNOV	+	=	1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestiture year and 0 otherwise.
CEOTNOV* $SROA_{it-1}$	-	=	CEOTNOV multiplied by $SROA_{it-1}$
$BATH_{it}$	+	=	1 if the firm's bonus payment to CEO is zero for segment i in year t and 0 otherwise.
LTIP*$SROA_{it-1}$	+	=	LTIP is 1 if the firm has an earnings-based long term incentive plan and 0 otherwise.
CEOWN*$FOCUS3_{it-1}$	+	=	CEOWN is 1 if firm's equity ownership by CEO is greater than the median equity ownership by CEO in the sample and 0 otherwise.
INSOWN* $FOCUS3_{it-1}$	+	=	INSOWN is 1 if firm' equity ownership by insiders is greater than the median equity ownership by insiders in the sample and 0 otherwise.
OTDOWN* $FOCUS3_{it-1}$	+	=	OTDOWN is 1 if firm's equity ownership by outsider directors is greater than the median equity ownership by outsider directors in the sample and 0 otherwise.

5. THE EMPIRICAL RESULTS

5.1 Descriptive Statistics and Univariate Test Results

Table 4.3 compares the characteristics of the board of directors, CEO and executive compensation plans between divesting firms and the control nondivesting group. As shown in the table, the size of the board is similar for divesting and nondivesting firms with means of 10.81 and 10.44 directors respectively. In addition, for composition of the board, the percentage of outside directors on the board is also similar between the two groups. Divesting firms have less equity ownership by outside directors and the difference between the two means is significant at 0.07 level for a one-tailed test. However, there is no significant difference of the ownership by insiders (directors and executives as a group) between the divesting firms and nondivesting counterparts.

The median number of years of CEO's tenure in the year of divestiture decisions is significantly less for divesting firms than that for the nondivesting firms (Wilcoxon Z statistic significant at .06 for a one-tailed test). This indicates that divesting firms are likely to have new CEOs than non-divesting firms. The insignificance of difference between the means of the two groups is caused by a few firms in the divesting group that have CEO tenure exceeding 20 years (mostly founders). The mean ownership of 2.95% by CEOs of the divesting firms is lower than 4.26% by CEOs of the control group, but the difference is not significant. In contrast, the divesting group have significantly high percentage (36%) of firms with CEO change than the nondivesting counterparts (23%)(t=2.03, p-value=0.04). This is consistent with prior evidence on the clustering of divestitures at the time of CEO turnover.

For characteristics of executive compensation plans, the percentage of firms with annual bonus plans (98%) is similar to that of nondivesting firm (95%). Therefore, annual bonus plan is very popular for both groups of firms. In addition, both divesting and nondivesting groups have similar number of firms that have formula-based annual bonus plan with 30 and 29 respectively. The number of firms that have LTIP is 30 for both groups. With respect to the CEO's base salary and annual bonus paid in the year of divestiture, we do not find any significant difference between divesting and nondivesting firms as shown in the last two rows of the table.

Table 4.4 presents the univariate tests of independent variables between the group of divesting segments and the group of continuing segments. The mean and median of $SROA_{it-1}$ for the divesting segments are significantly lower than these of the continuing segments, which indicates that divested segments were underperforming segments relative to firm's other operations. Similarly, firm's operating return ROA_{it-1} for the divested segments is significantly less than that for the control group. Consistent with results reported earlier in section 3, firm's leverage ratio ($LEVRG_{it-1}$) is not significantly different between the divesting and nondivesting groups. For variables that measure the unrelatedness of the segment to the firm's primary line of business ($FOCUS3_{it-1}$, $FOCUS2_{it-1}$, $FOCUS1_{it-1}$), divested segments were significantly more unrelated to the firm's primary line of business than the continuing segments measured at 3-digit, 2-digit and 1-digit SIC levels. Divested segments have lower market share in their own industries ($MKSHARE_{it-1}$) than the continuing segments. Finally, the mean ratio of segment's sales to firm's sales is significantly lower for the divested segments than that for the continuing segments, and the difference is statistically significant at the 0.01 level.

The mean and median of CEOTNOV for the divested segments are significantly higher than those of the continuing segments. This is consistent with prior evidence that divestitures cluster at the time of CEO turnover. CEOTNOV*$SROA_{it-1}$ has a mean of −0.113 for the divested segments, significantly less than that of the continuing segments. This indicates that segments divested by replacement CEOs were underperforming segments relative to firm's other operations.

For variable $BATH_{it}$, the mean value of 0.265 for the divested segments is not significantly different from 0.23 for the continuing segments. The univariate test suggests that divestitures are not clustered at the time when CEOs expect to finish in the low bound of their bonus plan. Therefore, the evidence from univariate test is not consistent with the bath hypothesis. The mean value of LTIP*$SROA_{it-1}$ for the divested segments is not significantly different from that of the continuing segments. All three variables CEOWN*$FOCU3_{it-1}$, INSOWN*$FOCUS3_{it-1}$ and OTOWN*$FOCUS3_{it-1}$ have larger means for the divested segments than continuing segments. But this is largely due to the fact that the mean of $FOCUS3_{it-1}$ is larger for the divested segments than that for the continuing segments.

Table 4.5 reports the Pearson correlation coefficients across independent variables. We find that $SROA_{it-1}$ is negatively correlated with $SHOCK_{it-1}$ (significance at the 0.02 level), suggesting that segment's poor performance is at least partially caused by industry-wide poor performance in the segment's line of business. Both $SIZE_{it-1}$ and $MKSHARE_{it-1}$ are positively correlated with $SROA_{it-1}$. This is consistent with a positive effect of segment size and market share on the segment's profitability even though the correlation coefficient is significant only between $SIZE_{it-1}$ and $SROA_{it-1}$. In addition, there

are relatively larger correlation coefficients across variables $FOCUS3_{it-1}$, $FOCUS2_{it-1}$ and $FOCUS1_{it-1}$.

5.2. Results from Logistic Regressions

Table 4.6 reports the coefficient estimates of logistic regressions that assess the effects of CEO turnover and management incentives on divestitures. In regression (1), we include only those independent variables that were demonstrated to predict the likelihood of divestitures in Chapter 3[10]. The Chi-square statistic for testing the significance of all independent variables has a value 112.5, which is highly significant. This is evidence that these variables are statistically significant in assessing the likelihood of divestiture candidates. The estimated coefficient of $SROA_{it-1}$ is –1.90, significant at the 0.01 level. This suggests that the likelihood of divestiture is negatively related to the segment's performance relative to the firm's performance. Variables $FOCUS3_{it-1}$ and $FOCUS1_{it-1}$ have coefficient estimates 1.74 and 0.54, and are significant at the 0.01 and 0.1 levels respectively. This is consistent with divestitures being partly motivated to reverse diversification. In other words, the likelihood of a segment's divestiture increases in the unrelatedness of the segment to the firm's primary line of business. Variable $FOCUS2_{it-1}$ has an insignificant coefficient estimate. This is partly due to its high correlation with both variables $FOCUS3_{it-1}$ and $FOCUS1_{it-1}$. Segment size ($SIZE_{it-1}$) has a coefficient –1.92, statistically significant at 0.001 level. Therefore, smaller segments have higher likelihood of being divested with everything else equal. Consistent with our

[10] Due to the smaller sample size, we expect these variables to be less significant in general.

predicted signs, ROA_{it-1} and $MKSHARE_{it-1}$ have negative coefficients –2.24 and –1.73, but both are not significant at the 0.1 level. Similarly, $SHOCK_{if-1}$ has a positive coefficient estimate of 0.13, suggesting that poor industry performance in the segment's line of business increases the likelihood of divestiture. However, the coefficient estimate is not statistically significant. One of reason for the insignificance is its correlation with two independent variables, $SROA_{it-1}$ and ROA_{it-1}. Variable $LEVRG_{it-1}$ has an insignificant coefficient estimate, consistent with the result reported earlier in univariate test. In subsequent tests, variables $FOUCS2_{it-1}$ and $LEVRG_{it-1}$ are dropped in the logistic regressions in assessing the effects of CEO turnover and management incentives on divestitures.

In regression (2), we are interested in the effects of the past operating performance of the segment, a CEO turnover and the interaction between CEO turnover and the past operating performance of the segment on the probability of divestiture. The main effect for $SROA_{it-1}$ is still negative, but is now insignificant. $CEOTNOV_{it-1}$ has a positive coefficient estimate 0.42 (p-value=0.07). This is consistent with our hypothesis H1a and suggests new CEO's disposing of segments based on their fit with the incoming CEO's investment strategy. Additionally, we find that the interaction between CEO turnover and the past performance of the segment, $CEOTNOV*SRAO_{it-1}$, has an estimated coefficient of –3.33 with a t-value of 2.32. This indicates that CEO turnover also leads to segment dispositions that correct a failure to divest by the departing CEO. The insignificance of the main effect of $SROA_{it-1}$ suggests that poor performing segments are not very likely to become divestiture candidates unless accompanied by a change in the CEO. This suggests that much of the significance of $SROA_{it-1}$ in Chapter 3 may be attributable to the cause of

CEO turnover although the variable might become marginally significant with the larger sample size. The significantly poorer performance of segments associated with CEO turnover also suggests that segment's poor performance may have been one reason for the departure of the preceding CEO[11]. However, the main effect for CEO turnover also suggests that new CEOs divest segments because of different strategies from their predecessors in managing assets[12].

We investigate the effects of $BATH_{it}$ and $LTIP_{it}$ in regression (3). Contrary to our hypothesis H2a, $BATH_{it}$ has a statistically insignificant coefficient of -0.20. Also contrary to our hypothesis H2b, $LTIP*SROA_{it-1}$ has a statistically insignificant coefficient estimate -0.07. Therefore, the evidence here provides little support for the hypothesis that divestitures are used to take an earnings bath when CEOs expect to finish in the low bound of their annual bonus plans. Furthermore, we find no evidence that the existence of an LTIP increases the timeliness of divestitures[13].

In regression (4), we investigate the effect of equity ownership by CEO, insiders and outside directors on divestitures that increase corporate focus. INSOWN*FOCUS3, CEOOWN*FOCUS3 and OTSOWN*FOCUS3 have estimated coefficients 0.08, 0.05 and 0.42 with p-values equal to 0.81, 0.88 and 0.11 respectively. The p-value of OTSOWN provides some support for the hypothesis that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus

[11] We do not distinguish between CEOs' departures at normal retirement age and these because of dismissals since there are only 6 cases in our sample that CEOs leave at the age of 64, 65 and 66. The results are essentially unchanged when these 6 cases of CEO changes are excluded in the logistic regression.
[12] The significance levels in column 5 of the table suggests that correcting the entrenchment problem of the previous CEO and the desire for strategic change are comparable in predicting new CEO's divestitures.
[13] This result is unchanged when LTIP is directly included as an additional independent variable. LTIP also has an insignificant coefficient estimate in the logistic regression.

(H3c). In contrast, we find no evidence to support H3a and H3b in that equity ownership either by CEO or insiders as a group has no significant effect on the likelihood of focus-increasing divestitures.

Since INSOWN*DOCUS3$_{it-1}$, CEOOWN*FOCUS3$_{it-1}$ and OTSOWN*FOCUS3$_{it-1}$ are highly correlated, we drop INSOWN*DOCUS3$_{it-1}$, CEOOWN*FOCUS3$_{it-1}$ and report further results from regression (5). OTSOWN*FOCUS has a coefficient of 0.49 with significance at the 0.05 level. Therefore, there is consistent evidence to support our hypothesis H3c that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus[14]. Although not reported here, the findings on the effect of equity ownership by CEO, insiders, or outside directors, are not affected by whether the variables CEOWN, INSOWN and OTSOWN are included in the logistic regression. None of the three variables, CEOWN, INSOWN or OTSOWN, is itself significant.

5.3 Results from Logistic Regressions with Alternative Measure of Segment Performance

Table 4.7 presents results from logistic regressions when segment performance is alternatively defined as segment operating return. The objective is to check the robustness of our results from logistic regressions with alternative measure of segment performance.

[14] The estimated coefficients of INSOWN*FOCUS3$_{it-1}$ and CEOOWN*FOCUS3$_{it-1}$ remain insignificant when they are included individually in the regression. Furthermore, we re-defined CEOWN as the ratio of the equity value of his share ownership to his base salary. The results are qualitatively similar as reported here. That is, higher equity ownership by the CEO has no effect on divestitures that increase corporate focus.

In regression (2), CEO and CEO*SROA$_{it-1}$ have coefficient estimates –1.79 and –4.25 both significant at 0.01 level. Thus segments divested by replacement CEO had poorer performance prior to divestitures than divested segments that were not associated with CEO turnover. Also controlling for the past performance of divested segments associated with CEO turnover, the coefficient of CEO turnover suggests that CEO turnover increases the likelihood of divestitures because of different viewpoint or skills of replacement CEOs from their predecessors.

In regression (3), the estimated coefficients of BATH$_{it}$ and LTIP*ROA$_{it-1}$ are statistically insignificant, consistent with the results reported in table 4.6. The evidence provides little support for the hypotheses that divestitures are motivated to take an earnings bath and that LTIP increases the likelihood of divestitures. A possible reason for the lack of support for the big bath hypothesis is the increased scrutiny as well as active intervention by the compensation committee during divestitures. The evidence here is consistent with Dechow et al (1994) who reported evidence that the compensation committee actively intervene to shield CEO cash compensation from restructuring charges.

In regressions (4) and (5), OTDOWN*FOCUS3$_{it-1}$ has coefficient estimates of 0.45 and 0.53 with significance at the 0.1 and 0.05 levels respectively[15]. Therefore, our results on the effect of higher equity ownership by outside directors on divestitures that increase corporate focus are robust with respect to an alternative specification of segment

[15] Our findings on the effects of equity ownership by CEO, insiders, and outside directors are not affected by whether CEOWN, INSOWN and OTDOWN are included as additional independent variables in the logistic regression. None of the variables CEOWN, INSOWN and OTDOWN has significant coefficient estimate in the logistic regression.

performance. In contrast, there is no evidence to support the view that higher equity ownership by either the CEO or insiders increases the likelihood of divestitures that increase corporate focus.

5.4 Further Analyses

Table 4.8 presents results from logistic regressions when we control for the effect of firm's stock performance on divestitures. We introduce firm's abnormal stock returns in the year of divestiture (CAR_{it}) and in the year preceding divestiture (CAR_{it-1}) into the logistic regressions. Regression (6) in the table presents the estimated coefficients when $SROA_{it-1}$ is measured as the difference between segment's operating return and firms operating return. Regression (7) presents the estimated coefficients when $SROA_{it-1}$ is alternatively measured as segment's operating return.

As shown from results of logistic regression (6) in the table, the estimated coefficients of CAR_{it} and CAR were –0.6 (p=0.1) and 0.28 (p=0.36), which indicate that the likelihood of divestitures is negatively related to the firm's stock return in the year of divestiture but not to the abnormal stock return in the year preceding divestiture. Controlling for the effect of stock return in the last two years, our results on the effects of CEO turnover and management incentives on divestiture decisions are qualitatively similar to those reported in table 4.6 and table 4.7.

6. CONCLUSIONS

This paper reports results from an empirical study on the effects of CEO turonver and management incentives on divestitures. We investigate these effects in the context of

divestiture decisions. Based on a sub-sample of 100 firm-year or 117 segment-year divestitures and a control sample of industry-, size-matched non-divesting observations, we find that divesting firms are more diversified and have poorer performance than their control counterparts in the year preceding divestitures. The difference of the number of business segments between the two groups disappears in the year of divestiture.

Our results from logistic regressions suggest that poor segment performance did not directly lead to disposition unless accompanied by CEO turnover and that new CEOs divested more segments regardless of segment performance. The latter finding is consistent with new CEOs bringing in new skills or strategies in asset management. In contrast, we find no support for the big bath hypothesis. We find no evidence to support the hypothesis that the existence of a LTIP increases the timeliness of divestitures. Finally, we find that larger equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus; whereas higher equity ownership by either the CEO or by insiders has no significant effect divestitures that increase corporate focus.

Overall, our results are consistent with both strategic and entrenchment theories of divestitures. The poorer performance of divested segment associated with CEO turnover suggests that internal control mechanism has been effective in replacing managers that failed to dispose of or correct the poor performance of these segments. In addition, the finding that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus is consistent with the notion that higher equity ownership by outside directors increases the effectiveness of board monitoring.

Finally, the finding that segments divested following CEO turnover had significantly poorer performance suggests that poorer segment performance was one

reason for the CEO's departure. The implication is that segment information can be useful in monitoring CEO performance.

Table 4.1 Distribution of the Sample of Divestitures across Industries and Years

Panel A: Distribution of Divestitures across 2-digit SIC Industries

This table reports the distribution of 100 firm-year or 117 segment-year divestitures over 2-digit SIC codes. The sample is drawn randomly from firms that have segment divestitures through sell-offs during the period from 1990 to 1995 and whose stocks are traded on the New York Stock Exchange. The SIC code for the divesting company is the firm's primary SIC code obtained from COMPUSTAT, the SIC code for the divested segment is the first SIC code of the segment obtained from the Industrial Segment File on COMPUSTAT.

Industry	2-digit SIC Code	Number of Firms	Number of Segments	Industry	2-digit SIC Code	Number of Firms	Number of Segments
Agriculture Production	07	0	1	Railroads	40	1	0
Metals Mining	10	0	1	Water Transportation	44	1	2
Coal Mining	12	0	3	Transport. Service	47	0	1
Oil & Gas Exploration	13	6	10	Communications	48	3	2
Nonmetal Mining	14	1	2	Utilities	49	8	6
Building Construction	15	1	2	Durable Goods	50	4	3
Heavy Construction	16	1	0	Nondurable Goods	51	5	4
Food Products	20	2	1	General Merchandise	53	3	0
Tobacco Products	21	1	0	Auto Dealers	55	0	1
Textile Products	22	0	2	Apparel	56	0	2
Apparel	23	1	0	Miscellaneous Retail	59	2	3
Lumber and Wood	24	0	0	Deposit Institutions	60	0	2
Furniture and Fixtures	25	1	2	Non-depository Credit	61	0	2
Paper Products	26	2	1	Brokerage	62	0	1
Printing & Publishing	27	2	0	Insurance	63	1	4
Chemicals	28	6	7	Insurance Agents	64	0	1
Petroleum Refining	29	4	2	Real Estate	65	0	2
Rubber and Plastics	30	2	2	Holding Companies	67	0	2
Leather and Products	31	0	1	Personal Services	72	1	0
Stone, Clay, Glass	32	3	2	Business Services	73	1	5
Primary Metals	33	5	3	Auto Repairs	75	1	0
Fabricated Metals	34	6	4	Misc Repair	76	0	1
Inds. Mach. & Compt.	35	7	5	Amusements	79	0	1
Electricals	36	4	4	Health Services	80	1	1
Transportation	37	7	6	Education Services	82	0	1
Instrumentation	38	2	4	Professional Services	87	3	5
Miscell. Manufacturing	39	1	0	TOTAL		100	117

Table 4.1 (Continued)

Panel B: Distribution of Divestitures across Years

This table reports the number of firms with divestitures and the number of divested segments in each year for the sampling period from 1990 to 1995. The year of divestiture is based on the fiscal year in which management first reports the segment as a discontinued segment of business.

Year	Number of Firms	Number of Segments
1990	15	15
1991	14	18
1992	17	23
1993	21	25
1994	17	19
1995	16	17
Total	**100**	**117**

Table 4.2 Firm Characteristics of Divesting Sample and Control Sample

This table reports selected firm characteristics and performance measures for sample of divesting firms and control sample of industry- and size-matched nondivesting firms for the year preceding the divestiture and in the year of divestiture. N is the number of observations available for calculating the statistic. *p*-values are in parentheses.

Characteristic	Divesting firms				Control group of firms				*t*-statistic (Wilcoxon Z) for difference in	
	Mean	Med	StdDev	N	Mean	Med	StdDev	N	Mean	Med.
For the year preceding divestiture										
Book value of assets ($million)	5163	1169	12505	100	3909	1139	6808	100	0.44 (0.66)	0.57 (0.56)
Sales ($million)	4077	1410	8114	100	3355	1136	5015	100	0.75 (0.45)	0.70 (0.70)
Net income/total assets (%)[a]	0.77	2.62	10.8	100	4.27	4.03	7.33	100	**-2.67 (0.01)**	**-2.24 (0.02)**
Number of segments	3.79	4	1.39	100	2.86	3	1.04	100	**5.35 (0.00)**	**5.34 (0.00)**
Abnormal return (%)[b]	0.47	-8.4	43.6	95	1.72	0.30	36.5	98	-0.22 (0.83)	-0.85 (0.40)
Total liability/total assets	0.65	0.62	0.21	100	0.62	0.63	0.23	100	0.84 (0.40)	-0.94 (0.34)
For the year of divestiture										
Book value of assets ($million)	4659	1142	10501	100	4103	1272	6902	100	0.44 (0.66)	0.01 (0.99)
Sales ($ million)	3615	1367	7489	100	3535	1236	5155	100	0.08 (0.93)	0.54 (0.59)
Net income/total assets (%)[a]	-1.2	0.99	16.6	100	3.58	3.86	8.2	100	**-2.58 (0.01)**	**-3.05 (0.00)**
Number of segments	2.73	3	1.52	100	2.88	3	1.05	100	-0.81 (0.42)	-1.28 (0.20)
Abnormal return (%)[b]	-9.0	-8.8	34.7	96	3.57	-3.40	33.4	98	**-2.57 (0.01)**	**-2.59 (0.01)**
Total liability/total assets	0.63	0.63	0.21	100	0.64	0.63	0.23	100	-0.13 (0.89)	-0.14 (0.88)

Notes: [a] Net income is the income after extraordinary and discontinued operations for the year.
[b] The abnormal return is accumulated over 12 months preceding the fiscal year end.

Table 4.3 Characteristics of Board, CEO and Compensation Plans of Divesting and Control Samples

Selected characteristics of board of directors, CEO and compensation plans for sample of 100 divesting firm-year observations and control sample of 100 industry- and size-matched nondivesting firm-year observations. CEO turnover is 1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestiture year and 0 otherwise. Existence of annual bonus place is 1 if a firm has annual bonus plan and 0 otherwise. Existence of formula-based bonus plan is 1 if a firm stated a formula-based bonus plan in the proxy statement and 0 otherwise. Existence of long-term incentive plan is 1 if a firm has a accounting-based long-term incentive plan and 0 otherwise. Data on the characteristics were collected directly from proxy statements in the year of divestiture. The sample size is 100 for both groups of firms. *p*-values are in parentheses.

	Divesting firms			**Control group of firms**			***t*-statistic (Wilcoxon Z) for difference in:**	
Characteristic	**Mean**	**Med.**	**StdDev**	**Mean**	**Med.**	**StdDev**	**Mean**	**Med.**
Panel A: Board of directors								
Total number of directors	10.81	11	3.31	10.44	10	2.82	0.85 (0.39)	0.53 (0.59)
Percentage of outside directors (%)	71.50	75.00	14.00	69.91	70.00	13.00	1.21 (0.22)	1.14 (0.26)
Ownership by outside directors (%)	1.05	0.20	2.85	1.84	0.155	4.62	-1.48 (0.14)	0.48 (0.63)
Ownership by directors and executives as a group (%)	9.29	4.45	13.59	9.79	3.60	14.13	-0.26 (0.80)	0.33 (0.74)
Panel B: CEO								
No. of years as CEO	6.31	4.00	7.49	6.59	5.00	5.79	-0.30 (0.77)	-1.53 (0.12)
Ownership by the CEO (%)	2.95	0.63	7.08	4.26	0.58	10.21	1.05 (0.29)	0.30 (0.76)
CEO Turnover	0.36	0.00	0.48	0.23	0.00	0.42	**2.03 (0.04)**	**2.01 (0.04)**
Panel C: Executive compensation plans								
Existence of annual bonus plan	0.98	1	0.14	0.95	1	0.21	1.15 (0.25)	1.14 (0.25)
Existence of formula-based annual bonus plan	0.30	0	0.46	0.29	0	0.45	0.15 (0.88)	0.15 (0.87)
Existence of long-term incentive plan	0.30	0	0.50	0.30	0	0.49	0.00 (1.00)	0.00 (1.00)
CEO's base salary ($,000)	584	580	299	544	504	291	0.97 (0.33)	0.86 (0.38)
CEO's annual cash bonus ($,000)	421	272	545	403	235	501	0.25 (0.80)	0.02 (0.98)

Table 4.4 Results from Univariate Tests of Independent Variables

$SROA_{it-1}$ is segment's operating return-firm's operating return. ROA_{it-1} is firm's operating income divided by total assets. $LEVRG_{it-1}$ is total liability divided by total assets. $FOCUS3_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SHOCK_{it-1}$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all 3-digit industries and 0 otherwise. $MKSHARE_{it-1}$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. $SIZE_{it-1}$ is segment's sales divided by firm's sales.CEOTNOV is 1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestiture year and 0 otherwise. $BATH_{it}$ is 1 if the firm's bonus payment to CEO is zero in year t and 0 otherwise. LTIP is 1 if the firm has an earnings-based long term incentive plan and 0 otherwise CEOWN is 1 if firm's equity ownership by CEO is greater than the median equity ownership by CEO in the sample and 0 otherwise. INSOWN is 1 if firm' equity ownership by insiders is greater than the median equity ownership by insiders in the sample and 0 otherwise. OTDOWN is 1 if firm's equity ownership by outsider directors is greater than the median equity ownership by outsider directors in the sample and 0 otherwise.n=655. *p*-values are in parentheses.

Variables	Pred	Divestiture subsample (N=117)		Control Subsample (N=538)		T-statistic (Wilcoxon Z) for differences in	
		Mean	Med.	Mean	Med.	Mean	Med.
$SROA_{it-1}$	-	-0.160	-0.026	0.049	0.015	-2.32 (0.02)	-8.27 (0.001)
ROA_{it-1}	-	0.070	0.052	0.085	0.069	-1.98 (0.05)	-1.65 (0.10)
$LEVRG_{it-1}$	+	0.650	0.064	0.644	0.063	0.25 (0.80)	0.22 (0.82)
$FOCUS3_{it-1}$	+	0.960	1	0.630	1	12.6 (0.001)	7.14 (0.001)
$FOCUS2_{it-1}$	+	0.880	1	0.520	0	9.80 (0.001)	7.22 (0.001)
$FOCUS1_{it-1}$	+	0.700	1	0.342	0	7.60 (0.001)	7.16 (0.001)
$SHOCK_{it-1}$	+	0.340	0	0.240	0	2.17 (0.03)	2.33 (0.02)
$MKSHARE_{it-1}$	-	0.042	0.030	0.066	0.07	-2.61 (0.01)	-3.41 (0.001)
$SIZE_{it-1}$	-	0.152	0.135	0.343	0.278	-10.60 (0.001)	-7.40 (0.001)
CEOTNOV	+	0.402	0	0.297	0	2.20 (0.03)	2.20 (0.03)
CEOTNOV* $SROA_{it-1}$	-	-0.113	0	0.018	0	-3.88 (0.03)	-5.11 (0.001)
$BATH_{it}$	+	0.265	0	0.234	0	0.70 (0.48)	0.70 (0.48)
LTIP*$SROA_{it-1}$	+	0.180	0	0.03	0	4.04 (0.001)	6.04 (0.001)
CEOWN*$FOCUS3_{it-1}$	+	0.496	0	0.299	0	4.13 (0.001)	4.08 (0.001)
INSOWN* $FOCUS3_{it-1}$	+	0.550	1	0.314	0	4.60 (0.001)	4.76 (0.001)
OTDOWN* $FOCUS3_{it-1}$	+	0.530	1	0.296	0	4.65 (0.001)	4.85 (0.001)

Table 4.5 Pearson Correlation Coefficients across Independent Variables

(see table 3.5 for variable definition)

Variables	$SROA_{it}$	ROA_{it-1}	$LEVRG_{it-1}$	$FOCUS3_{it-1}$	$FOCUS2_{it-1}$	$FOCUS1_{it-1}$	$SHOCK_{it-1}$	$MKSHARE_{it-1}$	$SIZE_{it-1}$	CEOTNOV	CEOTNOV* $SROA_{it-1}$	$BATH_{it}$	LTIP* $SROA_{it-1}$	CEOOwn*FOCUS3t-1	INSOWN* $FOCUS3_{it-1}$
ROA_{it-1}	0.06														
$LEVRG_{it-1}$	-0.07	-0.00													
$FOCUS3_{it-1}$	-0.06	-0.03	0.02												
$FOCUS2_{it-1}$	-0.08	-0.04	0.03	0.79											
$FOCUS1_{it-1}$	-0.07	-0.11	0.05	0.55	0.70										
$SHOCK_{it-1}$	-0.09	-0.19	0.05	0.02	0.04	0.11									
$MKSHARE_{it-1}$	0.05	0.12	0.11	-0.06	-0.08	-0.07	-0.04								
$SIZE_{it-1}$	0.07	0.04	-0.05	-0.58	-0.56	-0.45	-0.10	-0.00							
CEOTNOV	-0.04	0.09	0.09	0.02	0.03	0.03	0.00	-0.02	-0.05						
CEOTNOV* $SROA_{it-1}$	0.70	0.04	-0.02	-0.06	-0.06	-0.04	0.00	0.04	-0.27	0.12					
$BATH_{it}$	-0.00	-0.05	0.14	0.07	0.05	0.04	-0.02	-0.06	-0.06	0.10	0.08				
LTIP* $SROA_{it-1}$	0.44	0.02	-0.03	0.00	0.00	0.03	-0.06	-0.08	0.00	0.05	-0.05	-0.03			
CEOWN* $FOCUS3_{it-1}$	-0.03	-0.11	-0.04	0.48	0.35	0.21	-0.00	-0.18	-0.23	-0.21	0.00	0.01	-0.05		
INSOWN* $FOCUS3_{it-1}$	-0.04	-0.03	-0.11	0.49	0.39	0.22	0.02	-0.19	-0.24	-0.03	0.00	0.05	-0.02	0.74	
OTDOWN* $FOCUS3_{it-1}$	-0.03	-0.10	-0.08	0.48	0.41	0.23	-0.00	-0.12	-0.22	-0.10	0.01	0.02	-0.03	0.55	0.59

Notes: Pearson correlation coefficient >0.10 or <-0.10 is significant at the 0.01 level , Pearson correlation coefficient >0.08 or <-0.08 is significant at the 0.05 level, Pearson correlation coefficient >0.07 or <-0.07 is significant at the 0.1 level.

Table 4.6 Results of Logistic Regressions

Dependent variable is 1 if segment i is divested in year t and 0 otherwise. $SROA_{it-1}$ is segment's operating return-firm's operating return. ROA_{it-1} is firm's operating income divided by total assets. $LEVRG_{it-1}$ is total liability divided by total assets. $FOCUS3_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SHOCK_{it-1}$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all 3-digit industries and 0 otherwise. $MKSHARE_{it-1}$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. $SIZE_{it-1}$ is segment's sales divided by firm's sales.CEOTNOV is 1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestiture year and 0 otherwise. $BATH_{it}$ is 1 if the firm's bonus payment to CEO is zero in year t and 0 otherwise. LTIP is 1 if the firm has an earnings-based long term incentive plan and 0 otherwise CEOWN is 1 if firm's equity ownership by CEO is greater than the median equity ownership by CEO in the sample and 0 otherwise. INSOWN is 1 if firm' equity ownership by insiders is greater than the median equity ownership by insiders in the sample and 0 otherwise. OTDOWN is 1 if firm's equity ownership by outsider directors is greater than the median equity ownership by outsider directors in the sample and 0 otherwise. n=655. *t*-values are in parentheses. *** indicates significance at the 0.01, ** indicates significance at the 0.05, and * indicates significance at the 0.1 levels for a two-tail test.

Variables	Pred	(1)	(2)	(3)	(4)	(5)
INTERCEPT	-	-2.58 (3.67)***	-2.76 (4.49)***	-2.76 (4.49)***	-2.79 (4.50)***	-2.75 (4.51)***
$SROA_{it-1}$	-	-1.90 (2.62)***	-0.58 (1.01)	-0.57 (0.83)	-0.55 (0.78)	-0.58 (0.81)
ROA_{it-1}	-	-2.23 (1.46)	-3.55 (2.16)**	-3.43 (2.08)**	-3.12 (1.86)*	-3.28 (2.00)**
$LEVRG_{it-1}$	+	-0.18 (0.2)				
$FOCUS3_{it-1}$	+	1.74 (2.76)***	1.82 (3.20)***	1.80 (3.18)***	1.47 (2.46)***	1.50 (2.55)***
$FOCUS2_{it-1}$	+	0.08 (0.2)				
$FOCUS1_{it-1}$	+	0.54 (1.86)*	0.52 (2.06)**	0.52 (2.05)**	0.54 (2.10)**	0.55 (2.16)**
$SHOCK_{it-1}$	+	0.12 (0.48)	0.12 (0.47)	0.13 (0.50)	0.14 (0.56)	0.13 (0.51)
$MKSHARE_{it-1}$	-	-1.33 (0.87)	-1.72 (1.14)	-1.66 (1.11)	-1.04 (0.68)	-1.34 (0.86)
$SIZE_{it-1}$	-	-2.12 (2.93)***	-1.98 (2.71)***	-2.02 (2.75)***	-2.19 (2.92)***	-2.18 (2.93)***
CEOTNOV	+		0.42 (1.75)*	0.38 (1.61)*	0.48 (1.85)*	0.46 (1.88)*
CEOTNOV* $SROA_{it-1}$	-		-3.33 (2.32)**	-3.24 (2.26)**	-3.19 (2.21)**	-3.29 (2.27)**
$BATH_{it}$	+			-0.20 (0.72)	-0.22 (0.85)	-0.21 (0.80)
LTIP*$SROA_{it-1}$	+			-0.02 (0.03)	-0.07 (0.17)	-0.07 (0.06)
CEOWN*$FOCUS3_{it-1}$	+				0.05 (0.14)	
INSOWN* $FOCUS3_{it-1}$	+				0.08 (0.24)	
OTDOWN* $FOCUS3_{it-1}$	+				0.43 (1.58)	0.50 (1.98)**
% of Concordant pairs		79.3	79.4	79.6	80.8	80.3
Chi-square statistic for the model		112.05	120.90	122.23	126.4	126.00

Table 4.7 Results of Logistic Regressions with Alternative Measure of Segment Performance

Dependent variable is 1 if segment i is divested in year t and 0 othwise. **$SROA_{it-1}$ is segment's operating return.** ROA_{it-1} is firm's operating income divided by total assets. $LEVRG_{it-1}$ is total liability divided by total assets. $FOCUS3_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3-digit level and 0 otherwise. $FOCUS2_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2-digit level and 0 otherwise. $FOCUS1_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1-digit level and 0 otherwise. $SHOCK_{it-1}$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all 3-digit industries and 0 otherwise. $MKSHARE_{it-1}$ is segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. $SIZE_{it-1}$ is segment's sales divided by firm's sales.CEOTNOV is 1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestiture year and 0 otherwise. $BATH_{it}$ is 1 if the firm's bonus payment to CEO is zero in year t and 0 otherwise. LTIP is 1 if the firm has an earnings-based long term incentive plan and 0 otherwise CEOWN is 1 if firm's equity ownership by CEO is greater than the median equity ownership by CEO in the sample and 0 otherwise. INSOWN is 1 if firm' equity ownership by insiders is greater than the median equity ownership by insiders in the sample and 0 otherwise. OTDOWN is 1 if firm's equity ownership by outsider directors is greater than the median equity ownership by outsider directors in the sample and 0 otherwise. n=655. *t*-values are in parentheses. *** indicates significance at the 0.01, ** indicates significance at the 0.05, and * indicates significance at the 0.1 levels for a two-tail test.

Variables	Pred.	(1)	(2)	(3)	(4)	(5)
INTERCEPT	-	-2.58 (3.67)***	-2.96 (4.81)***	-2.97 (4.79)***	-3.01 (4.86)***	-2.97 (4.86)***
$SROA_{it-1}$	-	-1.90 (2.62)***	-0.58 (1.07)	-0.52 (0.91)	-0.51 (0.85)	-0.52 (0.89)
ROA_{it-1}	-	-1.33 (1.02)	-1.27 (1.01)**	-1.21 (1.00)**	-1.01 (0.86)	-1.04 (0.86)**
$LEVRG_{it-1}$	+	-0.18 (0.33)				
$FOCUS3_{it-1}$	+	1.74 (2.76)***	1.84 (3.23)***	1.82 (3.19)***	1.48 (2.46)***	1.49 (2.54)***
$FOCUS2_{it-1}$	+	0.08 (0.2)				
$FOCUS1_{it-1}$	+	0.54 (1.86)*	0.51 (2.02)**	0.51 (2.02)**	0.53 (2.07)**	0.54 (2.15)**
$SHOCK_{it-1}$	+	0.12 (0.50)	0.15 (0.58)	0.13 (0.50)	0.17 (0.65)	0.13 (0.54)
$MKSHARE_{it-1}$	-	-1.73 (1.17)	-1.79 (1.42)	-1.64 (1.06)	-1.07 (0.69)	-1.37 (0.88)
$SIZE_{it-1}$	-	-1.92 (2.63)***	-1.95 (2.66)***	-2.00 (2.69)***	-2.16 (2.89)***	-2.15 (2.89)***
CEOTNOV	+		0.42 (1.75)*	0.69 (2.61)***	0.78 (2.77)***	0.78 (2.87)***
CEOTNOV* $SROA_{it-1}$	-		-3.33 (2.32)**	-4.24 (2.59)***	-4.33 (2.60)***	-4.37 (2.64)***
$BATH_{it}$	+			-0.17 (0.62)	-0.19 (0.73)	-0.18 (0.69)
LTIP*$SROA_{it-1}$	+			-0.03 (0.09)	0.05 (0.05)	-0.09 (0.08)
CEOWN*$FOCUS3_{it-1}$	+				0.00 (0.00)	
INSOWN* $FOCUS3_{it-1}$	+				0.13 (0.37)	
OTDOWN* $FOCUS3_{it-1}$	+				0.45 (1.66)*	0.53 (2.07)**
% of Concordant pairs		79.3	79.4	79.9	81.1	81.0
Chi-square statistic for the model		112.05	120.90	125.00	129.6	129.00

Table 4.8 Results of Logistic Regressions Controlling for Stock Returns

Dependent variable is 1 if segment i is divested in year t and 0 othwise. $SROA_{it-1}$ is segment operating return -firm's operating return. In regression (6). $SROA_{it-1}$ is segment's operating return in regression (7). **CAR_{it} is firm's abornal return in year t, and CAR_{it-1} is firm's abnormal return in year t-1 for segment i.** $FOCUS3_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 3 digit level and 0 otherwise. $FOCUS2_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 2 digit level and 0 otherwise. $FOCUS1_{it-1}$ is 1 if segment's SIC code is not equal to firm's primary SIC code at 1 digit level and 0 otherwise. $SHOCK_{it-1}$ is 1 if segment's 3-digit industry operating return falls into the lowest 25% for all 3-digit industries and 0 otherwise. $MKSHARE_{it-1}$ is Segment's sales divided by aggregate sales of the segment's 3-digit SIC industry. $SIZE_{it-1}$ is Segment's sales divided by firm's sales.CEOTNOV is 1 if there is a change of CEO in the 24 months preceding the fiscal year end of the divestiture year and 0 otherwis $BATH_{it}$ is 1 if the firm's bonus payment to CEO is zero for segment i in year t and 0 otherwise. LTIP is 1 if the firm has an earnings-based long term incentive plan and 0 otherwise CEOWN is 1 if firm's equity ownership by CEO is greater than the median equity ownership by CEO in the sample and 0 otherwise. INSOWN is 1 if firm' equity ownership by insiders is greater than the median equity ownership by insiders in the sample and 0 otherwise. OTDOWN is 1 if firm's equity ownership by outsider directors is greater than the median equity ownership by outsider directors in the sample and 0 otherwise. N=626. *t*-values are in parentheses. *** indicates significance at the 0.01, ** indicates significance at the 0.05, and * indicates significance at the 0.1 levels for a two-tail test.

Variables	Pred.	(6)	(7)
INTERCEPT	-	-2.97	-2.93
		(5.01)***	(4.95)***
$SROA_{it-1}$	-	-0.58	-0.62
		(1.04)	(1.04)
CAR_{it}	-	-0.60	-0.66
		(1.60)*	(1.73)*
CAR_{it-1}	-	0.28	0.30
		(0.91)	(0.97)
$FOCUS3_{it-1}$	+	1.50	1.56
		(2.50)***	(2.58)***
$FOCUS1_{it-1}$	+	0.50	0.44
		(1.91)*	(1.65)*
$SHOCK_{it-1}$	+	0.10	0.12
		(0.43)	(0.56)
$MKSHARE_{it-1}$	-	-1.45	-1.38
		(0.86)	(0.80)
$SIZE_{it-1}$	-	-2.33	-2.29
		(2.99)***	(2.99)***
CEOTNOV	+	0.52	0.79
		(1.97)*	(2.73)***
CEOTNOV* $SROA_{it-1}$	-	-1.86	-3.86
		(1.66)*	(2.38)**
$BATH_{it}$	+	-0.03	-0.11
		(0.01)	(0.42)
LTIP*$SROA_{it-1}$	+	0.05	0.29
		(0.04)	(0.32)
CEOWN*$FOCUS3_{it-1}$	+	0.16	0.02
		(0.48)	(0.07)
INSOWN* $FOCUS3_{it-1}$	+	-0.05	0.06
		(0.14)	(0.17)
OTDOWN* $FOCUS3_{it-1}$	+	0.40	0.39
		(1.50)	(1.44)
% of Concordant pairs		79.7	81.0
Chi-square statistic for the model		117.6	124.4

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CHAPTER 5

DISCUSSION AND CONCLUSIONS

This thesis reports two empirical studies on firms' divestitures of segments of businesses. The first empirical study investigates the usefulness of segment information in predicting divestitures controlling for the use of aggregate information. The results of this study provide insights into the role of segment information in financial statement analysis in general and in predicting divestitures in particular. Given the considerable controversy on the role of top management in divestitures, our second study examines the effects of CEO turnover and management incentives on divestitures. The results from the second study shed light on the extent to which divestitures around CEO turnover are causes of earnings management by incoming CEOs or consequences of failure to divest poorly performing segments by departing CEOs.

Our empirical analysis of the usefulness of segment information in predicting divestitures indicates that the probability of segment divestiture is positively related to the existence of industry shock in the segment's line of business rather than in the firm's primary line of business. In addition, we find that the more un-related is the segment line of business to the firm's primary line of business, the more likely it becomes a divestiture candidate. We also find that the likelihood of divestiture is negatively related to the segment's operating return, growth opportunity and market share. Our empirical tests for the usefulness of segment information uniformly reject the null hypothesis that segment information is not incrementally useful in predicting divestitures.

The results of this study have highlighted the importance of segment information in predicting divestitures and perhaps similar corporate changes that involve economic

units within corporations. Given the prevalence and pace of restructuring activity witnessed in the last two decades, this study should help us understand the increased demand for segment information from the investment community. To financial analysts, our results imply that industry, firm-specific and segment information are relevant information in predicting future divestitures.

Our second study investigates the effects of CEO turnover and management incentives on divestiture decisions. We find that divestitures are not driven by poor segment performance *per se* rather than are largely driven by new CEOs disposing of segments for which the exit value exceeds the going concern value and the existence of these disposal opportunities follows from the failure to divest in a timely manner by their predecessors. In addition, we find the new CEOs divest more segments regardless of segment performance. However, we find no support for the hypothesis that managers time divestitures in the year in which CEO's bonus payment is zero. We find no evidence to support that the existence of earnings based long term incentive plans (LTIP) increases the timeliness of divestitures. Finally, we find that higher equity ownership by outside directors increases the likelihood of divestitures that increase corporate focus; whereas higher equity ownership either by the CEO or insiders has no significant effect on divestitures that increase corporate focus.

Our empirical evidence on the effects of CEO turnover and management incentives on divestitures is more consistent with the entrenchment and strategic theories of divestitures than the new CEOs' earnings management incentive to divest. Thus our results suggest that internal control mechanism has been effective in replacing CEOs that did not divest poorly performing segments in a timely manner. Our finding that higher

equity ownership by outside directors increases the likelihood of focus-increasing divestitures is also consistent with the agency based argument that effectiveness of board monitoring increases in the equity ownership by outside directors.